

Accessible Health Information Technology (IT) for Populations with Limited Literacy:

A Guide for Developers and Purchasers of Health IT

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HEALTH IT

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Preface

This guide and checklist are intended for developers and purchasers of health information (IT) that is designed to be accessed and used by consumers. As most health IT developers have little knowledge of populations with limited literacy and of the technical standards and aspects of accessible health IT design, this guide and checklist provide a structure, strategies, and other resources for the development of these technologies. Similarly, purchasers of health IT (e.g., health plans, pharmaceutical companies, foundations, and other non-profit organizations) that desire to make technologies available to limited-literacy adults, can use this guide and checklist to evaluate a health IT product. For those purchasers who contract out the development of their product, this guide can be used to direct and validate the developer's work.

Our process for developing this guide and checklist included a review of the IT and health IT literature; examination of products' and organizations' Web sites; and discussions with developers and purchasers of health IT as well as researchers involved in the evaluation of health IT for limited-literacy populations.* Although we sought out well-documented, evidence-based guidelines, we found that the development of accessibility standards for many of these technologies is still in the early stages and that additional and larger scale research is needed. Thus, we have compiled a checklist based on what is known at this point in time and hope that this checklist will be updated as additional evidence becomes available

*The term "health IT" is used throughout this guide to refer to hardware and software as well as devices, applications, and interfaces.

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Accessible Health Information Technology (IT) for Limited-Literacy Populations Checklist

Section I. Introduction to this Guide and Checklist

Health information technology (IT) has become an important vehicle for providing health information to consumers and is increasingly being used by consumers for other functions, including self-care, informed and shared decisionmaking, connecting with health care providers, communicating with others with similar health issues, and storing and accessing personal health records. Of concern, however, is that the literacy level required to effectively use most health IT is much higher than that of a large share of the U.S. population, and its content and format pose considerable barriers as well.¹ To ensure that those with limited literacy benefit from these technologies, health IT must be designed to be accessible to these populations.

Numerous reasons may explain why so little attention has been paid to making health IT available to limited-literacy populations. These reasons include the perception that limited-literacy populations lack access to health IT and would not know how to use these devices and applications; that the number of adults with limited literacy is small and insignificant; and that there are few financial incentives to encourage the development or purchase of such IT. Often overlooked, however, are the benefits to developers and purchasers for their design of accessible health IT for limited-literacy populations. These benefits include:

- *Broadening the potential audience.* A large percentage of adults have limited literacy: 14 percent (30 million) have below basic prose literacy, and 29 percent (62 million) have basic prose literacy.² These 92 million persons provide considerable opportunity to expand the audience of health IT products.
- *Increased understanding and usage for all populations, including those with higher literacy.* Higher literacy user groups also benefit from making health IT accessible to limited-literacy populations.
- *Enhanced reputation.* Developers and purchasers demonstrate expertise in reaching vulnerable populations and their social responsibility towards adults with limited literacy. For developers, this reputation can translate into increased business from purchasers.

With the health care environment's increasing emphasis on engaging consumers in their care, the market for consumer health IT has been expanding. To support this new paradigm, health plans are providing consumers with information and tools to enhance their decisionmaking ability. Similarly, State and Federal Governments are promoting the development of health IT, including a focus on personal health records and other systems that interface with consumers. As health

¹ There are multiple dimensions of literacy. General literacy is defined as the ability to utilize reading, writing and computational skills to function in society. Health literacy is the ability to obtain, process, understand, and act on health information. eHealth literacy is the ability to seek, find, understand, and appraise health information from electronic sources and apply this knowledge to addressing or solving a health problem.

² Below basic prose literacy is defined as literacy to complete no more than the most simple and concrete literacy skills; basic prose literacy is defined as literacy to perform simple and everyday literacy activities. U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, 2003 National Assessment of Adult Literacy. http://nces.ed.gov/naal/kf_demographics.asp. Accessed September 24, 2007.

plans and governments strive to engage consumers in their own care, accessible information and tools to support and empower consumers—including those with limited-literacy—will be crucial.

When properly designed, health IT is used by limited-literacy populations. The table below highlights three health IT products that have been well-received and utilized by adults with limited literacy.

Examples of health IT that have been well-utilized by both limited- and higher literacy populations	
MiVIA	An Internet-accessible personal health record (PHR) in Spanish for migrant and seasonal farm workers, MiVIA's goal is to improve users' health outcomes, continuity of care, and health literacy. MiVIA also allows for access to email and a member portal that provides community resource information in accessible language and format. It also includes a provider portal that allows providers access to workers' health information. MiVIA is now used by 5,200 farm workers.
Health Hero	A "technology in a box" home health device that plugs into a phone line, Health Hero prompts the user with easy-to-read health questions, collects data, then transmits the data to a provider. It is the predominant home health device used by the Veteran's Administration (VA), with over 80 percent of patients in the VA's home health program utilizing it.
CHESS (Comprehensive Health Enhancement Support System) breast cancer module	An information and support Web site for women with breast cancer, CHESS provides information services (a compilation of frequently asked questions and answers, articles on breast cancer, a resource guide and directory of organizations and services), support services (discussion groups, ask an expert, and personal stories), and decision services (assessment tools, health charts, and decision aids).

It is hoped that this guide will facilitate the development of health IT accessible to limited-literacy populations and that it will be used by purchasers of health IT as a product evaluation guide. The rest of this guide is organized as follows:

- Section II is an overview of health IT for limited-literacy populations.
- Section III describes the principles of accessible health IT.
- Section IV is a list of additional resources.
- The checklist for the design and purchase of accessible health IT is included as an Appendix.

Section II. Overview of Health IT for Limited-Literacy Populations

Health IT offers limited-literacy (as well as higher literacy) populations numerous advantages:

- Increased availability and access to health information. Information is provided on a wide range of topics, offering basic to in-depth information on each topic.
- Access and management of their own health care information (e.g., personal health records).
- Learning opportunities that are more visual and interactive than printed materials and other traditional forms of health education. Users may enter information, receive personalized feedback, and have information transmitted to health care providers who then monitor and followup their care.

Below is an overview of the predominant health IT for use by consumers, with examples of what they typically offer and how they are used.

Predominant health IT for use by consumers	
Internet Web sites	Along with making health information available on almost any subject, Web sites offer interactive health tracking tools, message boards and chat rooms, and host interfaces such as Web portals, personal health records, and secure patient-provider messaging.
Touchscreen kiosks	Commonplace in shopping malls, grocery stores, and banks, kiosks provide educational sessions aimed at improving self-care for a specific health condition.
Personal wireless devices (cell phone, BlackBerry, and PDA)	Small, portable, and private, these devices have the ability to send and receive text messages and email, host games, and interface with the Internet.
Home monitoring devices	For use by patients and/or home care providers, these devices are tied to an information system and give actionable information to patients and/or providers.

Health IT usage by those with limited literacy remains well below that of higher literacy populations. Although the availability and use of computer and other health IT has increased among limited-literacy populations, a digital divide remains. Developers and purchasers of health IT can help to reduce this divide by ensuring that the reading level, content, and format of these technologies are accessible to limited-literacy populations.

Section III. Principles of Accessible and Usable Health IT

To best serve users of health IT, information must be both accessible and usable. This guide uses the term “accessibility” to refer to how well users can use a product to achieve their goals and how satisfied they are with that process (some call this “usability.”) Many of the issues raised by the term “accessibility” are addressed by the universal design approach. This section describes the importance of universal design, overall guidelines for accessible health IT, and guidelines for specific health IT (Internet Web sites; computer kiosks; mobile phones, BlackBerrys, and Personal Digital Assistants; and home monitoring devices).

Universal Design

Universal design endorses the design of products, services, and environments so they are usable by as many people as possible, regardless of age, ability, or circumstance.³ It suggests that all technologies meant for use by the general public should also be accessible to limited-literacy populations.

Below are the basic universal design principles. Although most developers will be familiar with this terminology, purchasers of health IT who are not should ask developers whether these properties are incorporated into their design.

Basic universal design principles are:

- Design simply: Technologies and applications should be simple, emphasizing important elements, simple structures, and clean, standards-based markup.
- Build well: Take full advantage of inherent health IT properties, such as fallbacks, flexibility, and user control. (See universalusability.com Web site for additional information.)
- For Internet sites, use HTML over other formats: Provide documents in nonstandard formats (e.g., PDF and Flash) only as an alternative to HTML.⁴

Health IT incorporates many elements that support universal design, although attention is required to ensure that they are used to enhance usability for limited-literacy populations. IT (and non-IT) guidelines and evaluation tools often do not address literacy, and care must be paid to ensure that literacy is directly and sufficiently addressed.

Guidelines for all Health IT

A number of general guidelines are applicable to the different types of health IT. Many of these guidelines are adapted from low-literacy guidelines for print materials (e.g., pamphlets). Although print guidelines have been around for many years, they retain their relevance and serve as the foundation for accessible health IT.

³ The Center for Universal Design. http://www.design.ncsu.edu/cud/about_ud/about_ud.htm. Accessed September 30, 2007.

⁴Universalusability. http://universalusability.com/access_by_design/index.html. Accessed September 17, 2007.

The major principles for ensuring accessible health IT for those with limited literacy include the use of the following:

- Plain and clear language.
- Content that is relevant to the audience.
- Format that is conducive to reading and comprehension.
- Content that appeals to diverse racial and ethnic groups.
- Content that has undergone iterative testing and revision.

The following sections discuss the rationale for each of these principles, checklist items to comply with these principles, and elaborate on those items that would benefit from examples or further explanation.

Plain and Clear Language Is Used

Adults with limited-literacy comprehend best when plain and clear language is used. Plain and clear language presents information in a way that makes it as easy as possible for people to understand. The goal is that users will understand a document the first time they read it.

Some attributes of plain and clear language are as follows:

- Words are short, simple, and familiar (1-2 syllable, no jargon, acronyms, abbreviations).
- Unavoidable medical and technical terms are explained.
- Sentences are short.
- Content is written in the “active” voice (rather than “passive” voice).
- Word usage is consistent throughout.
- Reading level is not above 6th grade.

As per the last bullet, it is crucial that the reading level not be higher than the 6th grade. Studies show that the reading level for most IT materials is far beyond the reading level of limited-literacy populations, and that most health education material is written at a 10th grade or higher level. Although it may be difficult to write or rewrite materials below the 6th grade level, over one-fifth of adults are unable to read above the fifth grade level.⁵ In addition, the reading level does not provide a complete picture of whether a user will be able to comprehend and use a document.

A number of tools are available to assess reading level (e.g., Flesh-Kincaid and SMOG (Simplified Measure of Gobbledook)). Reading level is usually computed “by hand,” although some of these tools are available as a computer application, such as those included in Microsoft[®] Word. All documents that are to be tested should be “prepared” before the assessment. This entails removing periods from abbreviations, colons, and semi-colons, because if not removed, they are counted as the end of a “sentence” and will result in an underestimation of the grade level. (See Section IV, Additional Resources, for further information.)

⁵ Get Caught Reading. <http://www.getcaughtreading.org/literacyfacts.htm>. Accessed September 30, 2007.

Content Is Relevant to Audience

Along with being able to use and comprehend a health IT, its content must be relevant to prospective users. Users must have a need and desire for the information, and it must assist them in meeting their health care needs. The content must also be framed appropriately. For example, information pitched at those who are already familiar with the subject matter or bombarding users with too much information at one time may cause users to exit the health IT application and not return. Such users may also be discouraged from using other health IT applications.

The following items are important for the development of content relevant to a limited-literacy audience:

- Assumes little or no background knowledge (including understanding of the body and the health care system).
- Information is relevant to users.
- Limited number of messages are delivered.
- Numbers and percentages are appropriate (e.g., only one number provided per point, no calculations or inferences are required, and use easy-to-understand phrasing, such as 1 in 10 instead of 10 percent).
- Graphic illustrations clarify text.

Format Is Conducive to Reading and Comprehension

The format of the document influences a person's ability to read and comprehend it. Adults with limited-literacy may be particularly disadvantaged by a difficult-to-read format. The format of health IT is especially important because many IT features, such as scrolling, moving objects, animation, and search functions, are difficult for adults with limited literacy.

The following are key to an accessible format style:

- A lot of white space (fewer words or less dense text).
- Short line length, preferably a maximum of 40-50 characters.
- Similar information grouped into sub-sections or "chunked."
- Bullets and Q&A used to break up text.
- Dark text (preferably black) on a light or white background.
- Large and familiar font (at least 12-point, Arial, Helvetica, Verdana, or Times New Roman).
- Consistent use of font sizes and styles throughout.
- Upper and lower case letters (do not use all capital words as they are more difficult to read).
- Justification of left-hand margin only.

Content Appeals to Diverse Racial and Ethnic Groups

To promote the use of health IT among racial and ethnic minority groups, immigrants, and English-as-a-second-language speakers, it is important to pay attention to culture and language. Health IT can be made more appealing to a multicultural audience by drawing on examples from diverse ethnicities. All information about any racial or ethnic group should be accurate and not promote stereotypes. (See Section IV for cultural competency information and resources.)

To promote the use of health IT among racially, ethnically, culturally, and linguistically diverse users, ensure that:

- Content is culturally appropriate and sensitive to users.
- Members of these groups are portrayed accurately in pictures and other graphic illustrations.
- Translation from English is accurate and idioms and expressions are appropriate.
- Target population is specified (if appropriate).

Content Has Undergone Iterative Testing and Revision

Following recommended guidelines helps to increase the accessibility of limited-literacy populations. It is just as important, however, that the health IT is tested repeatedly throughout the design process, and that prospective users are included in the testing. All versions in additional languages should be tested by native speakers.

The conceptual design should be assessed throughout the design process. This may include a review of the sample prototype through discussions, brainstorming, or storyboarding (a series of simple pictures to show the sequence for completing a task) with prospective users. After revision, the health IT should undergo an initial accessibility review by the design team and be tested by prospective users. The testing by prospective users—also called a usability test—should address the following questions:

- Is the application easy to use and navigate?
- Is the content appropriate, acceptable, and applicable?
- Will participants want and choose to use the application?

Again, the health IT should be revised based on the test results. Testing and revision should continue until there is little to be learned from additional testing.

Healthfinder.gov is an example of a Web site that has employed an iterative design process to produce a highly usable Web site. Developed by the U.S. Department of Health and Human Services as a health promotion tool, this Web site began as a paper prototype and was tested and revised over a 3-year period.

As of August 2007, the healthfinder.gov home page and “Eat Healthy” section appeared as follows:

U.S. Department of Health & Human Services www.hhs.gov

healthfinder.gov
Your guide to healthy living

[About Us](#) | [Site Map](#) | [Contact Us](#)

search healthfinder

The 5 Most Important Things You Can Do To Stay Healthy

- Eat Healthy**
Small changes in your eating habits can make a big difference in your life.
- Get Active**
Simple strategies to keep you moving.
- Watch Your Weight**
If you are not getting active every day, you are at risk for becoming overweight. To lose weight, you need to eat fewer calories than you burn.
- Quit Smoking**
Quitting smoking is one of the most important things you will ever do. Smoking is the most preventable cause of death and disease in the United States.
- Get Screened**
Get important screening tests for health conditions such as heart disease and cancer.

Other Ways To Stay Healthy

Topics A-Z

my healthfinder

Find healthy recommendations for you or someone you care about.

Who are you trying to help today?
 Me
 Someone Else

Age:

Sex: Female
 Male

U.S. Department of Health & Human Services www.hhs.gov

healthfinder.gov
Your guide to healthy living

[About Us](#) | [Site Map](#) | [Contact Us](#)

search healthfinder

< Home

Eat Healthy

The Basics | **The Benefits** | **Get Started!**

- The Basics**
Your body needs the right vitamins, minerals, and other nutrients to stay healthy.
- The Benefits**
If you eat a healthy diet and exercise, you can keep your body strong and fit.
- Get Started!**
Making small changes in your eating habits can make a big difference in your life. Here are some tips and tools to get you started.

If you are trying to help someone Eat Healthy... [Get tips to help](#)

Eating healthy can protect you from [Heart Disease](#), [Obesity](#), [Cancer](#) and [Diabetes](#).

What do you want to do today?

- Drink water instead of soda or juice.
- Print out this [Food Diary](#) to keep track of what you eat.
- Make a shopping list with healthy snacks like fruit and low-fat yogurt.
- Pick a new recipe from this list of [heart-healthy recipes](#).

The process for iterative testing and revision is as follows:

- Draft and review sample prototype.
- Conduct a team review of accessibility, and one by health literacy experts, if feasible.
- Revise based on team and expert review.
- Test with target audience, including limited-literacy and culturally diverse persons
 - Watch testers use it
 - Ask testers about their experience
 - Assess testers' comprehension
- Revise based on tests with target audience.
- Test in all languages, if appropriate

Guidelines for Specific Health IT

The various types of health IT discussed in this guide (Internet Web sites; computer kiosks; mobile phones, BlackBerrys, and Personal Digital Assistants; and home monitoring devices) differ in their hardware and software and how they are utilized. Thus, in addition to the general guidelines discussed, each of these forms of health IT has its own set of guidelines. Following is an overview of potential accessibility issues for each, guidelines to enhance accessibility, and other suggestions to support the development of health IT for adults with limited literacy.

Internet Web sites

Internet Web sites pose considerable barriers to their use, particularly for adults with limited literacy. As the Web site usability consultant Jakob Nielsen stated: Difficulty reading and comprehending Web site materials may be exacerbated for adults with limited literacy. The most notable difference is that users with limited literacy cannot understand a text by glancing at it. They must read word for word because they cannot skim and decide what to skip, and many times are forced to skip over large amounts of information. When they have to scroll, it breaks their concentration because they cannot scan to find where they left off. Also, searching creates problems because they have difficulty spelling. For those who successfully spell their search words, the fragmentation of search results makes it difficult for them to choose those results most relevant to their needs.⁶

Adherence to the following will help overcome many Internet Web sites' obstacles (see the checklist in Section IV for in-depth items):

- Designed for old hardware and software
- Home page is simple
- Information is prioritized
- Minimal amount of text per screen
- Navigation is simple and consistent
- Need for scrolling is minimized
- Searching is simplified
- Links (hyperlinks) are provided for additional information, with clearly defined hyperlinks that link directly to the information
- Printer-friendly option is provided
- Audio transcription option is provided
- Site map is easy to find
- Contact information is easy to find

Computer Kiosks

The term “computer kiosk” may refer to both a computer and its box, or it may refer to the computer itself, because an interactive computer may function as a kiosk without the box. Often the term “kiosk” is meant to convey a computer that uses a touchscreen technology, rather than the box itself.

⁶ Jakob Nielsen's Alertbox, Low-Literacy Users, <http://www.useit.com/alertbox/20050314.html>. Accessed September 6, 2007.

Computer kiosks are often used in health care facilities as a means of educating patients to care for a specific health condition. The usability of the computer kiosk depends on the person being able to quickly learn to operate the computer and application, and a message that is conveyed simply and succinctly. These applications are most effective when they use a “teach back” technique, which provides a multiple choice quiz that has the user restate the messages taught.

Checklist items specific to computer kiosks are:

- Preliminary practice session provided.
- One question or idea presented per screen.
- Information limited to what is needed to manage the health problem.
- Option to repeat messages.
- Audio transcription, if appropriate.
- “Teach back” techniques used to reinforce and confirm learning.

Mobile Phone, BlackBerry, and Personal Digital Assistant (PDA)

As cell phones and PDAs take on Blackberry’s software and Internet capabilities, these technologies have the ability to accommodate similar health IT. Health IT for these devices is available for recording and reinforcing health behaviors and managing chronic conditions. Reminder messages can be sent through voice mail, and simple, easy-to-read reminders can be sent via text messaging. In addition, new and advanced devices are available that record and transmit biomarkering data from individuals to health care providers. The opportunity to rely on voice (rather than text) also offers the potential for increased accessibility for those with limited literacy. However, to be usable by limited-literacy populations, the device’s design and applications must be readable, accessible, and its text messages simple.

Handheld technologies are more accessible when:

- Design features are geared to adults with limited literacy (e.g., large keys, letters on all keys, simple navigational structure, increased size of device).
- Reliance on text is minimized (e.g., use of voice-to-text technology or text-to-voice technology).
- Text messaging is simple (e.g., uses short and familiar words, accommodates common misspellings).

Home Monitoring Devices

The increased emphasis of our health care system on home- and self-care has spurred the development of home monitoring technology for use by patients themselves or home health providers, many of whom have limited literacy. Advances in health IT now tie home monitoring devices to an information system that provides actionable information to patients and providers. Proper usage and accessibility for adults with limited literacy will depend on the design of the device, its application and interface, and the quality of the instructions provided.

Accessible home- or self-care medical devices should adhere to the following:

- Device designed for use by adults with limited literacy
 - Appropriate for home, work, and other use
 - Display of information readable and comprehensible
 - Compact (but still readable)
 - Easy to operate, with limited number of steps
 - Low maintenance
 - Large keys with clear icons
 - Self-calculating
 - Stores test results
 - Single function buttons
 - Voice instructions and results
 - Automatic calibration

- Clear and easy-to-follow instructions provided through simple print and video tutorials (online or DVD) and help manuals
 - Content is readable and appropriate (as in general health IT guidelines)
 - Instructions reiterate and review main steps
 - Numbered steps are used to describe procedures
 - Steps are described in the same order in which they will be performed
 - Each step is illustrated
 - Critical components or warnings are emphasized
 - Phone number for customer support is provided

The last section, Section IV, lists additional resources, including tools and additional information, for the development of accessible health IT for populations with limited literacy. The complete checklist for accessible health IT for populations with limited literacy follows.

Section IV. Additional Resources

Translation of medical terminology to clear and simple English

Medicalese-English translator

http://medicalhome.alabama.gov/applications/documentlibrary/2.2.6%20LindaAndrews_com%20Medicalese%20Translator.htm.

Usability background and guidance

Jakob Nielsen's Usability Web Site: useit.com. See "Lower-Literacy Users."

<http://www.useit.com/alertbox/20050314.html>.

Usability.gov. Usability Basics.

<http://usability.gov/basics/whatusa.html>.

Information, guidelines, and evaluation tools for accessible content for Web sites

Making Your Web Site Senior Friendly: A Checklist. National Institute on Aging and National Library of Medicine, revised Sept. 2002.

<http://www.nlm.nih.gov/pubs/checklist.pdf>.

The Children's Partnership. Online Content for Low-Income and Underserved Americans: An Issue Brief by the Children's Partnership.

<http://www.techpolicybank.org/AM/Template.cfm?Section=Home&CONTENTID=9568&TEMPLATE=/CM/ContentDisplay.cfm>.

The Children's Partnership Guidelines for Content Creation and Evaluation of Web Sites, by Lazarus W and Lipper L, October 2003.

<http://www.contentbank.org/AM/Template.cfm?Section=Home3&Template=/CM/ContentDisplay.cfm&ContentID=4679>.

In-depth advice and guidelines for clear and simple writing

Clear & Simple: Developing Effective Print Materials for Low-Literate Readers, National Cancer Institute, updated 2/27/03.

<http://www.cancer.gov/cancerinformation/clearandsimple>.

Plain English Campaign. Plain English Tips for Clear Web sites.

http://www.plainenglish.co.uk/Web_sitesguide.pdf.

Saying It Clearly, TalkingQuality.gov, Agency for Healthcare Research and Quality.

<http://www.talkingquality.gov>.

Reading level tests

Stephens C. General explanation of reading level tests.

<http://plainlanguage.com/newreadability.html>.

In-depth explanation of SMOG.

http://www.hsph.harvard.edu/healthliteracy/how_to/smog_2.pdf.

Flesh Kinkaid Grade Level and Flesh Reading Ease Score.

<http://flesh.sourceforge.net/>.

Fog Index and Readability Formulas.

<http://www.klariti.com/business-writing/Fog-Index-Readability-Formulas.shtml>.

Cultural competency

Planning Culturally and Linguistically Appropriate Services: A Guide for Managed Care Plans. Summary. February 2003. Agency for Healthcare Research and Quality, Rockville, MD.

<http://www.ahrq.gov/about/cods/planclas.htm>.

What is Cultural Competency? Office of Minority Health, U.S. Department of Health and Human Services.

<http://www.omhrc.gov/templates/browse.aspx?lvl=2&lvlID=11>.

Information and statistics on health literacy in the United States

Kutner M, et al. (2006) Health Literacy of America's Adults: Results from the 2003 National Assessment of Health Literacy (NCES 2006-483). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

<http://nces.ed.gov/pubs2006/2006483.pdf>.

Potter L, Martin C. Health Literacy Fact Sheets. Center for Health Care Strategies, Inc.

http://www.chcs.org/publications3960/publications_show.htm?doc_id=291711.

McCray AT. Promoting Health Literacy. J Am Med Inform Assoc 2005;12(2):152-163.

Berkman ND, et. al. Literacy and Health Outcomes. Evidence Report/Technology Assessment No. 87. (Prepared by RTI International–University of North Carolina Evidence-based Practice Center under Contract No. 290-02-0016). AHRQ Publication No. 04-E007-2. Rockville, MD: Agency for Healthcare Research and Quality. January 2004.

<http://www.ahrq.gov/downloads/pub/evidence/pdf/literacy/literacy.pdf>.

Appendix

Accessible Health Information Technology (IT) for Limited-Literacy Populations Checklist

Checklist for Developers and Purchasers of Health IT

For All Health Information Technologies and Applications	Yes	or	No
Plain and Clear Language Is Used			
Words are short, simple, and familiar (1-2 syllables, no jargon, acronyms, abbreviations)	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Unavoidable technical terms are explained	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Sentences are short	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Written in “active” voice, rather than “passive” voice (Use “Mary visited the clinic,” rather than “The clinic was visited by Mary.”)	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Consistent use of words throughout	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Reading level is not above 6th grade	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Content Is Relevant to Audience			
Assumes little or no background knowledge (including understanding of the body and health care system)	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Information is relevant to users	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Limited number of messages are delivered	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Numbers and percentages are appropriate <ul style="list-style-type: none"> - Only one number provided per point - No calculations or inferences required - Easy to understand phrasing (e.g., 1 in 10 instead of 10 percent) 	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Graphic illustrations clarify text <ul style="list-style-type: none"> - Clearly labeled with captions to explain graphics - Directly applicable to text - Simple and understandable - Non-distracting and not busy 	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Format Is Conducive to Reading and Comprehension			
A lot of white space (fewer words or less dense text)	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Short line length (40-50 characters)	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Similar information is grouped into sub-sections or “chunked”	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Bullets are used to break up text	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Q&A is used, as applicable	<input type="checkbox"/>	Yes	<input type="checkbox"/>
Dark text on light background (preferably black on white)	<input type="checkbox"/>	Yes	<input type="checkbox"/>

Large and familiar font (at least 12-point, Arial, Helvetica, Veranda, or Times New Roman)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Consistent use of font sizes and style throughout	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Upper and lower case letters used (no "ALL CAPITAL WORDS")	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Justification of left-hand margin only	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Content Appeals to Diverse Racial and Ethnic Groups		
Content is culturally appropriate and sensitive to users	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Translation is accurate and idioms and expressions are appropriate	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Graphic illustrations are culturally appropriate and reflect target population	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Target population is specified (if appropriate)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Content Has Undergone Iterative Testing and Revision		
Sample prototype is drafted and reviewed	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Accessibility is reviewed by team and health literacy experts, if feasible	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Revised based on team and expert review	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Tested with target audience, including limited-literacy and culturally diverse persons <ul style="list-style-type: none"> - Watched testers using it - Asked testers about their experience - Assessed testers' comprehension 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Revised based on tests with target audience	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Tested in all languages (if appropriate) by native speakers	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Checklist Items Specific to Internet Web sites		
Yes or No		
Designed for old hardware and software <ul style="list-style-type: none"> - Site runs without requiring Flash, Shockwave, or other plug-ins - Loads quickly (even on dial-up connections), with no big graphics - Browser independent; site displays and operates on all major browsers - Visuals clear on black and white monitor - Scales to smaller monitors 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Home page is simple	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Information is prioritized <ul style="list-style-type: none"> - Main point at top of page - Other information can be viewed without scrolling 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Minimal amount of text per screen	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Navigation is simple and consistent <ul style="list-style-type: none"> - Site flow is logical, with headings provided and text organized under headings - Main choices are placed in a linear menu - Limited number of navigation choices - Sections appropriately named - Home icon at the end of each section 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Need for scrolling is minimized <ul style="list-style-type: none"> - Text placed in the window - Important content is in a single main column 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Searching is simplified <ul style="list-style-type: none"> - Top search hits answer query - Search results are easy to understand - Spelling prompts are provided - Spelling errors are allowed or compensated for - Site is organized so that the need for searching is minimized 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Links (hyperlinks) supply additional information and provide direct linkage	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Linkage buttons (hyperlinks) are clearly identified	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Printer-friendly option provided	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Option for audio transcription	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Easy-to-find site map	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Easy-to-find contact information	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Checklist Items Specific to Computer Kiosks

Yes or No

Preliminary practice session provided	<input type="checkbox"/> Yes	<input type="checkbox"/> No
One question or idea presented per screen	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Information limited to what is needed to manage the health problem	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Option to repeat messages	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Audio transcription (if appropriate)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
"Teach back" techniques used to reinforce and confirm learning	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Checklist Items Specific to Mobile Phones, Blackberrys, and PDAs

Yes or No

Device design is accessible to adults with limited literacy <ul style="list-style-type: none"> - Large keys - Letters on all keys - Simple navigational structure - Increased size of device 	<input type="checkbox"/> Yes	<input type="checkbox"/> No
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<p>Reduced reliance on text</p> <ul style="list-style-type: none"> - Voice-to-text technology - Text-to-voice technology 	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>Text messaging is simple</p> <ul style="list-style-type: none"> - Uses short and familiar words - Accommodates common misspellings 	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>Checklist Items Specific to Home- or Self-Care Medical Devices</p>	
	<p>Yes or No</p>
<p>Device is designed for use by adults with limited literacy</p> <ul style="list-style-type: none"> - Appropriate for home, work, and other use - Display of information readable and comprehensible - Compact (but still readable) - Easy to operate, with limited number of steps - Low maintenance - Large keys with clear icons - Self-calculating (does not require user to compute values) - Stores test results and transmits them to providers (if appropriate) - Single function buttons - Voice instructions and results - Automatic calibration 	<input type="checkbox"/> Yes <input type="checkbox"/> No
<p>Clear and easy-to-follow instructions provided through simple print and video tutorials (on-line or DVD) and help manuals</p> <ul style="list-style-type: none"> - Readability and content are appropriate (as in general health IT guidelines) - Numbered steps are used to describe procedures - Steps are described in the same order in which they will be performed - Each step is illustrated - Main steps are reviewed - Critical components or warnings emphasized - Phone number provided for customer support 	<input type="checkbox"/> Yes <input type="checkbox"/> No