CADTH Health Technology Review

Funding and Access to Assistive Technologies: Electronic Aids to Daily Living

Environmental Scan

CADTH

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Abbreviations

ALS   amyotrophic lateral sclerosis

AT   assistive technology

ATC   assistive technology centre

ATDC   Assistive Technology Device Classification

CAYA   Communication Assistance for Youth and Adults

CHD   central hospital districts

DAT   *Domotica, Ausili, Terapia occupazionale* (i.e., "Smart Home, Assistive Technology, and Occupational Therapy")

EADL   electronic aids to daily living

ES   Environmental Scan

FTE   full-time equivalent

GATE   Global Cooperation on Assistive Technology

HAAT   Human, Activity, Assistive Technology Model

ICF   International Classification of Functioning, Disability and Health

MND   motor neurone disease

MPT   Matching Person and Technology

NDIS   National Disability Insurance Scheme

OT   occupational therapist

SLP   speech language pathologist

TIL   Technology for Independent Living

Key Messages

- The overall objectives of this Environmental Scan were to identify and describe the essential components of an electronic aids to daily living (EADL) assistive technology (AT) program, circumscribe barriers and facilitators to equitable access, and identify and describe funding mechanisms. A literature search and stakeholder consultations informed this Environmental Scan.
- There is a lack of consensus as to how to define EADLs, who should be eligible for EADLs and how they should be funded, as demonstrated by the heterogenous findings in both the literature and the consultations.
- Funding mechanisms and eligibility criteria vary between jurisdictions with limited integration of funding available for EADLs and modified consumer product technologies.
- The majority of included publications generally discussed AT devices and service provision, with a lack of availability of information specific to EADL devices.
- User-centred approaches that are anticipatory of user needs in AT service delivery provision were noted in the literature as key to facilitating effective AT service delivery.
- Barriers to providing equitable access to EADLs include lack of awareness by both health professionals and users of AT devices and services, shortage of trained professional staff to provide individual supports, affordability and access to ATs, and limited user participation in decision-making with professionals in selecting ATs.

Context

EADLs are a category of ATs that include a range of devices that are used within the home to allow individuals with physical impairments to control their home environment, have improved independence and safety, and have more access to the community. Other names that are sometimes used to refer to EADLs include environmental control units, environmental control systems, and, more recently, electronic assistive technologies.[1,2] The implementation of EADLs can be a collection of assistive devices that are integrated and controlled through a main computer-based system or a single device that functions and is controlled on its own. In general, EADLs can be adapted to the user's need and based on their physical limitations to facilitate device operation, ensure proper functionality, and enable effective control of the environment.[1] Specifically, EADLs perform a variety of functions that are often grouped into these broad categories:

- Emergency call system (e.g., local buzzer system, smart phone)
- Home control (e.g., lights, thermostat, blinds, audiovisual equipment; speech generating devices may fall under this category if their function/purpose is home control)
- Access and exiting from the home (e.g., through customized buttons/switches, smart phone).

A fourth category that is sometimes included under EADLs are technologies that enable access to the external world from your home (e.g., email, social media, and online banking through a computer or tablet).

In the 2017 Canadian Survey on Disability, 1 in 5 Canadians (or 6.2 million people) aged 15 years and older reported living with 1 or more disabilities that limited their daily activities.[3]

Of those, 43% had a disability classified as severe or very severe that restricted, to varying degrees, their ability to perform their daily routines.[3] In 2012, more than 80% of Canadians living with a disability reported using at least 1 aid or assistive device to undertake daily activities and enable social participation.[4] While a proportion of those assistive devices are likely EADLs, there is a lack of data regarding usage of, and need for, EADLs among people in Canada living with disabilities.

ATs are paid for in a variety of ways in Canada and internationally, including through public funding, third-party insurance, charity, out-of-pocket payment, or a combination of these methods.[5,6] Publicly funded AT programs tend to vary widely in terms of their structure, eligibility criteria, and assistive devices funded.[5,6] In this context, there is a need to understand how different jurisdictions deal specifically with the EADL category.

This Environmental Scan was conducted to gather information on Canadian and international programs that provide access to EADLs to individuals with physical disabilities. The main purpose of this report is to identify and describe how AT programs in various jurisdictions are organized (e.g., essential personnel, service structure, device maintenance, reassessment programs), funded, and approach funding decisions for clients and EADL devices alike.

Objectives

The key objectives of this Environmental Scan are as follows:

- Identify and describe the essential components of an EADL AT program – including essential team members, service structure, device maintenance, and reassessment programs.
- Identify barriers and facilitators to providing equitable access to assistive technologies.
- Describe how other jurisdictions fund AT programs — including funding mechanisms, eligibility criteria, type of devices covered, and extent of coverage (i.e., full or partial), for EADL devices.
- Describe how other jurisdictions make funding decisions regarding coverage of basic and essential AT devices, including identifying and analyzing the key factors and considerations that determine an essential EADL.

This Environmental Scan does not include an assessment of the clinical or cost-effectiveness of the technology area. As such, conclusions or recommendations about the value of EADLs are outside the scope of this report.

Methods

The findings presented in this Environmental Scan are informed by a limited literature search and consultations with key informants from Canadian rehabilitation and social programs. Table 1 outlines the criteria for information gathering and selection.

CADTH

Literature Search

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Library, the University of York Centre for Reviews and Dissemination databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were electronic aids for daily living and physical disabilities. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2015 and February 12, 2020. An update of the literature search was run on December 7, 2020, to capture new research published after the initial search.

Additionally, a supplemental search was conducted in MEDLINE to locate publications from select countries identified in scoping as having programs related to EADL. The main search concepts were electronic aids for daily living and Australia, New Zealand, Denmark, Sweden, Norway, Finland, Iceland, and Greenland. The search was also limited to English language documents published between January 1, 2015 and January 14, 2021. No filters were applied to limit the retrieval by study type.

Screening and Study Selection

Literature identified through database searching was screened for relevance (Table 1) by 1 author. In the first level of screening, titles and abstracts were reviewed and the full texts of potentially relevant articles were retrieved. The final selection of full-text articles was based on their relevance in addressing the 4 objectives.

Table 1: Components for Literature Screening and Information Gathering

Criteria	Description
Population	Adults with physical disabilities that limit mobility and functioning (e.g., spinal cord injury, neuromuscular disorder)
Intervention	Electronic assistive technologies, including specialized EADL devices and mainstream consumer products that are used in the home environment and aimed at providing individuals with physical impairments with enhanced control, functionality, independence, safety, and access to the community. Examples of relevant technologies include: • emergency call systems • customized systems to control audiovisual equipment, lights, door locks, blinds, fans, appliances, home climate, etc. • systems and devices to facilitate entry and exit from the home • technologies that enable access to the external world from your home (i.e., email, social media, online banking through a computer or tablet) • mainstream smart home products such as smart speakers.
Settings	Personal home environments
Types of information	Literature search

EADL = Electronic Aid to Daily Living.

Consultations

Targeted consultations with key Canadian stakeholders were conducted between November 23, 2020 and December 17, 2020. The purpose of these consultations was to fill knowledge gaps identified following a review of the literature. Consultation contacts were identified by CADTH Liaison Officers, through stakeholder suggestions, and other available networks. Pre-planned consultation questions were developed (Appendix 1), and the consultations were conducted in the form of semi-structured 1 to 1 interviews using an online video conferencing platform. Consultation recordings were subsequently transcribed for analysis. Informants were not limited to any particular profession; however, they comprised mostly of clinicians (e.g., occupational therapists [OTs]) and academic researchers involved in the provision of care to individuals requiring EADLs in relevant health care facilities and settings.

Consultation discussions were guided by 4 core questions on the funding and components of EADL programs and the barriers and facilitators that had an impact on equitable access to ATs.

Synthesis Approach

Informants were asked for consent to include their responses, in aggregate or direct quotation form, in the report. Responses were analyzed according to the objectives of this Environmental Scan. In the case of multiple informants from 1 organization, all responses were included. Conversations were summarized and categorized using thematic analysis.

Findings from the literature search are incorporated with consultation results, where possible, and summarized within relevant sections of the report.

Stakeholder Feedback

The results of the consultations and literature search were presented in the form of a draft report that was posted on the CADTH website to elicit stakeholder feedback. Relevant stakeholder feedback was incorporated into this final version of the Environmental Scan based on input received.

Findings

Summary of Information Sources

The findings presented are based on a limited main literature search, an update to the main literature search, a country specific supplemental search, and consultations.

Main Search

The literature searches yielded 546 citations. After screening titles and abstracts, 434 citations were excluded and 112 potentially relevant reports from the electronic search were retrieved for full-text review. Additionally, 15 potentially relevant publications were retrieved from the grey literature search. Of these 139 potentially relevant articles, 27 articles were deemed eligible to address the objectives. Literature was excluded after full-text review, because the individual articles either did not address the objectives or did not meet the inclusion criteria for population, intervention, or setting. The majority of included publications

generally discussed AT devices and service provision, with a lack of availability of information specific to EADL devices.

Update Search

The update to the main literature search yielded 98 citations. After screening titles and abstracts, 87 citations were excluded and 11 potentially relevant reports from the electronic search were retrieved for full-text review. Additionally, 1 potentially relevant publication was retrieved from the grey literature search. Of these 12 potentially relevant articles, 4 articles were deemed eligible to address the objectives. Literature was excluded after full-text review, because the individual articles either did not address the objectives or did not meet the inclusion criteria for population, intervention, or setting.

Country Specific Search

The country specific literature searches yielded 38 citations. After screening titles and abstracts, 35 citations were excluded and 3 potentially relevant reports from the electronic search were retrieved for full-text review. Of these 3 potentially relevant articles, none were deemed eligible to address the objectives. Literature was excluded after full-text review, because the individual articles either did not address the objectives or did not meet the inclusion criteria for population, intervention, or setting.

Consultations

Findings are also based on consultations with key informants held in November and December 2020, representing 4 Canadian provinces (i.e., Alberta, Manitoba, New Brunswick, and Nova Scotia), 1 federal health care plan, and 2 academic researchers. Consultations were not held with informants from the remaining provinces, territories, and federal health care plans, owing to a lack of identified stakeholders in these jurisdictions, which is acknowledged as a limitation to this report.

Objective 1: Essential Components of an Electronic Aid to Daily Living Assistive Technology Program

This objective was addressed based on findings from the literature and consultations.

Essential Team Members and Skills

In high resource settings, AT personnel include physiotherapists, OTs, physical and rehabilitation medicine specialists, and speech language pathologists (SLPs), with AT provision comprising a part of the focus of their profession.[7] Professionals including rehabilitation engineers, orthotists and prosthetists, and other AT professionals may focus on AT service provision.[7] The literature suggests that OTs and SLPs are central in AT service provision, assessment, and delivery, particularly for assessing technology access, seating, cognitive and visual issues, and the capacity to operate the device.[8,9] Consultations revealed that this was reflected in Canadian practice. One informant from an AT program at a tertiary rehabilitation hospital,[10] with an approximate 500 client per year case load, reported their team was formed of 16 individuals of the following professions: OT, SLP, SLP assistant, teacher (mainly for children), biomedical technician, and a biomedical engineer, all of whom contribute to make up 10 full-time equivalent (FTE) positions total.

Another informant from an AT communication devices program at a rehabilitation and long-term care centre,[11] reported their team included 1.0 FTE each of an SLP, OT, rehabilitation assistant, electronics technologist, administrative assistant, and a program coordinator.

One informant from the AT services of a provincial tertiary rehabilitation facility specialized in neurologic conditions,[12] described the team as having 1.2 FTE of OTs, 1.0 FTE of rehabilitation engineer, 0.5 FTE of SLP, and a recreation therapist (FTE not reported). In this particular team, the recreation therapist assists with adaptive video gaming. For personalized access, the rehabilitation engineer modifies existing AT or designs custom AT with the help of 3-dimentional printing, electronic assembly, and other fabrication methods.

Two informants from the AT services of a provincial tertiary rehabilitation centre,[13] with an approximate 500 client per year caseload, reported their team as having an OT (FTE not reported), 1.0 FTE of rehabilitation engineer, 0.6 FTE of OT assistant, and an SLP (FTE not reported).

From the perspective of a federal health care plan, the people involved in case evaluation and reimbursement decisions include OTs, nurses, physicians, and case managers (FTE not reported).

In line with the literature, 2 academic researchers indicated that essential team members would generally comprise OTs, SLPs, SLP assistants, physical therapists, biomedical engineers, and other health professionals depending on the type of characteristics of the clientele.

A high level of professional skills and knowledge for AT service and delivery is needed to provide individually tailored AT solutions.[8] Therapists and health professionals need to know the AT devices available (both specialized and consumer products) and local funding systems, how devices can be adapted for individuals with various progressive and functional limitations, how the AT device interacts with a user's concurrent interventions, and how to assess user needs and outcomes.[8,9]

It was noted in the consultations that many health professionals are not sufficiently skilled to manage the AT needs of individuals with chronic conditions, which is echoed in the literature with the particular example of motor neurone disease (MND).[8,9] Informal and formal education, mentoring, and training by experienced AT users can build the capacity of novice users, providers, and professionals for AT provision.[7] One informant highlighted the current lack of standardization for credentialing in specialized AT practice in Canada. Furthermore, the inclusion of training for AT service provision within professional curricula vary across Canada with training ranging from less than 1 week to half courses and electives in OT programs. A user-centred approach and continuing education opportunities by and for professionals providing AT allow for specialization and addressing of various community needs.[7] Trained AT advisors increase AT awareness, access, and service delivery, as quality of training, consideration of user perspectives, AT device setup, and follow-up are determinants of continued AT device usage by users.[8,14] In particular, professionals who can provide independent support and advice through independent expertise centres, instead of those directly linked to manufacturers of AT products or a commissioning body, are favourably positioned to increase AT awareness.[8] An example of a network of these centres can be found in Italy, which could serve as a model for other jurisdictions.[8] Aside from these professionals, others that may be involved include pharmacists, community nurses, community and social workers, and in-home service providers, and where not available, non-professionals who are

supported by online information and tools.[8,15] Professionals' training and competencies, and user involvement positively impact outcomes of service delivery provision.[16]

Service Structure

The service delivery process is a key element of AT provision – it is the process an individual goes through to obtain an AT device that meets their needs.[8] Current models of delivery for AT services are usually reactive with little attention placed on anticipatory needs.[7] Outlined in the literature were 7 steps for service delivery provision to achieve the desired functional outcome for AT users: initial (first point of contact), assessment (evaluating user needs), typology (choosing an appropriate AT solution), selection (selecting specific devices), authorization (obtaining funding), delivery (getting the AT device to the user), and follow-up and management (continuing support).[7,8,16] Many of these steps were echoed by consultation informants, including 1 informant from an AT program at a tertiary rehabilitation hospital,[10] who indicated that clients access the service through a health care provider referral or by referring themselves. As an example care pathway, an individual would initially be assessed by an OT, followed by a cognitive assessment (as it applies for use of the technology) performed conjointly by an OT and SLP, and finally the SLP would do a language and communication assessment before a device would be selected.

Another informant from an AT communication devices program at a rehabilitation and long-term care centre,[11] reported that a SLP or other health care professional would need to refer the client to the program for assessment and service provision. If needed, staff will travel to remote communities to provide services. The transition of services at age 65 is relatively seamless for this program, which does not seem to be the norm elsewhere where funding ceases and new sources have to be identified. In contrast, literature findings did not discuss age-related changes to services.

Two informants from the AT services of a provincial tertiary rehabilitation facility,[12] described their program as being specifically for clients with a neurologic condition or upper limb amputations. Clients are referred to the facility by their community physician, health care provider, or can self refer. Referring providers may include notes suggesting the client would benefit from seeing the AT team. An initial intake takes place with a physiatrist who may recognize a need for the client to be assessed by the AT team. Otherwise, once a client is admitted to the facility, a clinician would need to recognize that the client has an unmet need and would then arrange a consultation for assessment and service provision by the AT team.

Similarly, 2 informants from the AT services of a provincial tertiary rehabilitation centre[13] indicated that clients are referred to their program from the facility's physiatry clinic. An assessment would follow, then device selection, followed by the securing of funding, device delivery, and ongoing monitoring.

From the perspective of a federal health care plan, plan members would generally consult their local health care provider for an initial assessment. If a recommendation or prescription for an EADL occurs, the plan administrator would assess the request and initiate a comprehensive in-home assessment to understand the functional needs of the plan member and to determine the best intervention to address those needs.

Additionally, 1 academic researcher provided information on 2 British Columbia AT programs. First, the Technology for Independent Living (TIL) program,[17] which provides EADL to individuals with severe physical disabilities upon referral from a community health care practitioner. The individual then has their needs and environment assessed before service

provision. Second, the Communication Assistance for Youth and Adults (CAYA) program,[18] which provides augmentative or alternative communication systems, which may include EADL features, to individuals with severe communication disability. Individuals can self refer or be referred by a health care professional.

Overall, consultations and the literature findings revealed that effective and optimal AT service provision includes: awareness by professionals and end users of AT devices and solutions; procedures and policies for funding mechanisms and eligibility decision-making; professional support, advice, and follow-up services; good quality products at affordable prices; training on using AT devices; and infrastructure for repairs and maintenance.[8]

Awareness of AT solutions includes provision of information through evidence-informed AT databases on the existence of specific AT products and their usability, effectiveness, availability, and quality.[8] Numerous countries have databases to provide updated and validated information on services and devices.[19] The European Assistive Technology Information Network search engine was established to connect websites from multiple European countries to make information on AT products publicly available to professionals and end users.[8] In Australia, there is a similar database that exists called the National Equipment Database, and the US has a database called AbleData.[8] However, maintenance of the sites is reported as challenging.[8] No such database was identified within Canada; however, our searches and consultations were not exhaustive. Furthermore, information on funding and service programs across Canada are available in a searchable database.[20] The WHO Priority Assistive Products List can be a starting point for developing a national information system.[8] The incorporation of self-management and peer mentoring into the provision of AT services and devices is important to a user-centred approach.[19]

Service Delivery Systems in Jurisdictions Other Than Canada

Information on service delivery systems in other jurisdictions was identified in the literature for Australia, Finland, Italy, Norway, the Republic of Korea, and Sweden.

Australia

Funding for assistive devices is part of the National Disability Insurance Scheme (NDIS),[21] which provides assistance to people with permanent and significant disability, by helping them achieve their goals, participate in daily life, and choose their own supports and services.[22] To be eligible, an individual must be aged younger than 65 years, reside in Australia, and satisfy 1 of the disability requirements set out in the NDIS Act.[22] The individual consults with their local state health services for an initial assessment and diagnosis of disability and rehabilitative health services.[22] State-level health care services also provide specialist, rehabilitation, and other therapies jointly with the NDIS.[22] If a person would benefit from AT supports, they are referred to the National Disability Insurance Agency, that implements the NDIS, and conducts an eligibility assessment to develop a support plan.[22] The NDIS uses the WHO definition of AT,[22] which is: "[...] any device or system that allows individuals to perform tasks they would otherwise be unable to do or increases the ease and safety with which tasks can be performed."[23]

Finland

In Finland, there are 20 central hospital districts (CHD) varying from 45,000 to 1.5 million residents, each with their own guidelines for lending AT devices, which were developed with the Ministry of Social Affairs and Health and the National Institute of Health and Welfare.[24] The guidelines set out ground rules for AT process, legislation interpretation, and service

provision.[24] AT service centres in the hospital districts maintain the rules and guidelines, with some CHDs harmonizing their rules.[24] In 2017, the ministry was in the process of creating national rules for AT services collated from each CHD, which address a user's function and participation, what is classified as an AT device versus a device users can buy themselves, and the standards that AT devices need to meet.[24]

Italy

In Milan, the *Domotica, Ausili, Terapia occupazionale* (DAT) (i.e., "Smart Home, Assistive Technology, and Occupational Therapy") service offers a comprehensive rehabilitation process, which includes individual AT counselling, OT training, and education to become independent AT users.[25] The service integrates experience from the Assistive Technology Information and Assessment Service.[25] The methodology for AT counselling involves a counselling request from the clients' physician or therapist, caregivers, or the client themselves.[25] The DAT service prepares information for the assessment, professionals with appropriate competencies are selected and discuss the strategy for intervention, AT devices are identified for trial, DAT professionals complete the assessment together with clients to identify priorities and the most appropriate solution based on the AT device trials.[25] After the assessment, conclusions are made by the team with documentation provided to clients.[25] A team technician also provides support for assembly and personalization of the AT solution if needed after the AT device is obtained by the client.[25] Medical professionals then verify the compliance of the system with prescriptions and other specifications and may prescribe training sessions led by a therapist if needed.[25] User satisfaction with the AT solution and services are completed using instruments such as the Quebec User Evaluation of Satisfaction with Assistive Technology (Table 3).[25]

Norway

One article described a case study in Norway. Although EADLs are not discussed explicitly, they appear to be included in the author's definition of AT, which encompasses "any product (including devices, equipment, instruments, and software) either specially designed and produced or generally available [...]".[26] Norway has a unified national system for AT that addresses users functional/practical daily problems.[26] This includes legislation for no cost access to necessary and appropriate AT, providing users with the same services regardless of location, involving user participation in the system, and emphasizing a focus on the individual.[26] Additionally, the system established a common information and communications technology system for registration of purchases, distribution, repairs and regular servicing, and refurbishing of AT.[26] Structurally, there are 18 AT centres, 1 in each county coordinating their local AT activities, serving as referral centres and working with rehabilitation and health services to address functional and practical daily problems of users.[26] The assistive technology centre (ATC) have personnel such as engineers and technicians, opticians, speech therapists, physiotherapists, and OTs with expert knowledge who give guidance to local authorities.[26] The municipalities have the responsibility of AT product provision, with trained professionals, often physiotherapists and OTs, responsible for assessing and identifying user needs, recommending and providing AT products, and conducting follow-up with users.[26] In the national AT system there are national competence centres that have distinct expertise areas, which ATCs can contact. Norway has national agreements with suppliers and retailers of AT products, from which ATCs purchase and distribute AT products to the municipalities.[26] The country also recycles a substantial portion of their AT products as a cost-saving approach.[26]

Republic of Korea

In the Republic of Korea, the AT service delivery system comprises 1 national assistive technology centre and 8 state-based ATCs, with a goal to have 16 state-based centres for a nationwide system.[27] Each state-based centre manages the local regional assistive technology centre. The majority of ATCs are established at existing institutes and rehabilitation hospitals and centres including the National Rehabilitation Research Institute.[27] ATCs run call centres, websites, and social media to provide information on AT funding sources and devices to clients.[27] Individualized AT services are available through the ATCs, with quality control of delivery occurring through service manuals.[27]

Sweden

Sweden has been funding ATs since 1968.[28] Access is widespread with ATCs located in all counties throughout the country,[29] and most ATs are funded by the government.[30] Devices can be prescribed by OTs, SLPs, physiotherapists, or nurses, following a process of assessment, selection, adaptation and implementation, education and training, and follow-up and evaluation.[28] Furthermore, AT use is recorded in an individual's medical health record[29] In 2007 Sweden started a pilot project to increase client's freedom of choice in the selection of their device.[28] Following a prescription, and with sufficient knowledge and experience to make a free choice, the user is given a voucher valued at the maximum amount the ministry of health will allow for the particular type of approved AT. The client is then free to chose the device, responsible for its purchase, and responsible for additional costs if the chosen AT exceeds the voucher value.[28]

Organizations, Frameworks, Tools, and Criteria for Assistive Technology Service Provision

Six informants from 3 Canadian provinces (Alberta, n = 1; Manitoba, n = 1; New Brunswick, n = 2), 1 federal health care plan, and 1 academic institution provided information on organizations, frameworks, tools, and criteria for AT service provision.

One informant from an AT program at a tertiary rehabilitation hospital,[10] indicated that AT services are provided to individuals if they have a communication need that fits within the capability of the AT program. Due to the large catchment area served by the program, staff are unable to travel to all areas within this geographic region. To access EADLs, individuals are encouraged to have a support person (e.g., a champion) in their environment to provide ongoing device assistance (e.g., charging the device, ensuring the device is accessible on a daily basis) and act as an alternate contact if needed for troubleshooting. For clients residing in remote areas, help with setup, troubleshooting, and repairs are supported by telephone or virtual meetings. Furthermore, the program uses a managed waitlist, such that clients with deteriorating conditions are moved up the queue.

Another informant from an AT communication devices program at a rehabilitation and long-term care centre,[11] reported that individuals are eligible for service if they have a severe communication disorder (i.e., where speech alone does not meet their daily communication needs). Additional eligibility criteria for service provision include being 18 years of age or older and residing in the province of Manitoba, which includes First Nations. Individuals must demonstrate that the equipment would be of benefit to them, and that they (or someone in their environment) can care for the equipment. Formal evaluation tools offer limited application with regard to communications devices; hence, the needs of users are assessed through informal interviews, observation, and questionnaires. Modified assessment tools are generally preferred by SLPs, who can tailor the tool to the case at hand.

Two informants from the AT services of a provincial tertiary rehabilitation facility,[12] described that individuals are eligible for services if they have a neurologic condition or upper limb amputation. Team members use a holistic and functional based approach to assess how they can improve the individual's function and quality of life, and the individual must demonstrate a willingness and motivation to engage with the proposed AT solution. Depending on the diagnosis some standardized assessment tools may be used (e.g., Spinal Cord Independence Measure, Measure of Control using EADL [MCEADL], Student [or client], Environments, Tasks, and Tools [S(C)ETT] framework[31]) either fully or partially, and technology literacy is also assessed to determine the type of tasks that can or cannot be performed.

From the perspective of a federal health care plan, the framework or tools used in a member's assessment is left to the professional judgment of their local health care practitioner. If specific parameters are needed by the plan administrator (e.g., does the client have the cognitive capacity to learn how to use the device), these would be requested as part of the assessment.

Additionally, 1 academic researcher provided information on 2 British Columbia AT programs. First, the TIL program,[17] where any individual having severe physical disabilities who needs help accessing their home environment, are eligible for service. The program[17] leaves the evaluative framework and tools up to the OT's professional judgment. Second, individuals are eligible for service by the CAYA program[18] if they are non-verbal. Here, too, the choice of evaluation framework and tools are left up to the professional judgment of the SLP and SLP assistant.

Information from the consultation informants indicated that specific frameworks, tools and criteria for general AT service delivery were not commonly used, leaving the specific choices up to the professional judgment of individual practitioners. This is supported by the literature which indicates that AT devices are often recommended without the use of a theoretical/conceptual framework.[32] Furthermore, when used, informants generally indicated needing to adapt instruments to the uniqueness of each case at hand. One informant from an AT program at a tertiary rehabilitation hospital[10] described using the S(C)ETT framework and feature matching to assess clients, refine a list of possible tools, and to guide the process of device trials. This process helps promote shared decision-making with input from clinicians, clients, and caregivers. Aside from the MCEADL and S(C)ETT frameworks, no other specific tool was identified. In contrast, organizations, frameworks, tools, and criteria for general AT service delivery provision found within included publications are outlined in Appendix 2. None were specific to EADLs and none were reflected in the consultations.

Of note, the Global Cooperation on Assistive Technology established by WHO has a collection of innovation snapshots on practices for AT products, personnel, service provision, and policy occurring globally, which is publicly available on their site: https://www.who.int/phi/implementation/assistive_technology/great_summit/e-proceedings/en/.[33]

Device Assessment, Evaluation, and Reassessment Tools for AT Service Provision

Eight informants, 6 from 4 Canadian provinces (Alberta, n = 1; Manitoba, n = 1; New Brunswick, n = 2, Nova Scotia, n = 2), 1 from a federal health care plan, and 1 from an academic institution provided information on device assessment, evaluation, and reassessment tools for AT service provision.

One informant from an AT program at a tertiary rehabilitation hospital,[10] indicated device trials are usually required, and with at least 2 different types of equipment so that the best solution can be identified for the client's need. After a successful trial period, evaluation takes place every 3 to 6 months until the client achieves stability, then they are discharged. Notwithstanding, users are encouraged to call back if their needs change or if their EADL malfunctions. Moreover, Alberta Aids to Daily Living requires authorizers (e.g., SLP, OT) to use a feature matching process based on assessed communication needs to match features required in the selected device.[34] Further, the assessment includes using the specific device to ensure the individual is able to use it effectively to meet identified functional outcomes and goals.[34]

Another informant from an AT communication devices program at a rehabilitation and long-term care centre[11] reported that clients are given up to 3, 4-week trials (i.e., to a maximum of 12 weeks total), to evaluate the device, see if additional modifications are needed, or conclude that the particular device is not a good fit. Rarely, clients need additional evaluation time, particularly those who have difficulties learning how to use the equipment or the software. Program team members evaluate clients on an annual basis to reassess user comfort with the device, frequency of use, and its continued functionality. Outside these evaluations, clients can contact the program if the device is not meeting their needs or if they need a reassessment because of a change in circumstances. Clients are never discharged from the program unless they no longer need the equipment due to an improvement in their condition, there is a change in their environment, or death.

Two informants from the AT services of a provincial tertiary rehabilitation facility[12] described that as part of the program, individuals are informally reassessed every time they return to the facility for a therapeutic appointment (e.g., every 3, 6, or 12 months). Follow-up evaluations are also completed via telehealth, phone, outreach on-site visit, consultation with the client's local care teams, or consultation with schools and other care providers. Here, too, clients are never discharged and are invited to contact the program at any time. As an additional service, this program also evaluates clients who wish to start or return to video gaming with friends and family. Depending on the needs assessed, the team will adapt gaming console buttons and joysticks to capitalize on the client's available movements and build a custom-made system.

Two informants from the AT services of a provincial tertiary rehabilitation centre[13] reported that while the program works with all manners of assistive devices, they do not refer to EADLs as such, but simply as ATs. The facility has a demonstration suite where clients can trial devices before selecting 1 that will fit their needs. Device trials can be arranged on a case-by-case basis; however, they have limited inventory. Post-discharge from the rehabilitation centre, clients may be followed as an outpatient or linked up with a community group (e.g., the Neil Squire Society,[35] Department of Labour and Advanced Education,[36] employment support groups).

From the perspective of a federal health care plan, device trials would be entirely dependent on what is available in the member's locale. A visit can be arranged to vendors that have demonstration suites, if available locally to the member. Members are welcomed to follow-up with the plan administrator as needed.

Additionally, 1 academic researcher provided information on 2 British Columbia AT programs. First, the TIL program,[17] which does not offer a trial program; however, if a device does not work for their needs, the client is welcome to return it. This program does not have a

demonstration suite; however, they collaborate closely with the GF Strong Rehabilitation Centre,[37] and clients or a community therapist can access trial equipment there. TIL provides the device and offers some initial training and setup, and it is the responsibility of the referring therapist to follow-up with the client. With the CAYA program, there is extensive client evaluation[18] until the client achieves stability, followed by periodic monitoring of decreasing frequency, and eventually monitoring is ceased if everything goes well.

The literature outlines several criteria to consider in choosing an assessment tool: the population, specific contextual relevance of the instrument, clinical context, and appropriateness of the evaluation to the objectives.[32] While no particular assessment instrument emerged from our consultations, informants indicated the general need to adapt instruments to the uniqueness of each case at hand.

The literature also outlined the types of outcomes to be considered in assessments including: effectiveness (ease of activity and participation, performance and satisfaction, and physical functioning), social significance (AT device type acquired, cost, device usage [frequency], independence, and AT device abandonment), and subjective well-being (user satisfaction with AT devices and services, and quality of life).[16] By addressing incompatibility between a potential user and the technology proposed early on, it may reduce non-use, inappropriate use, and disappointment.[32] Internationally, the use of assessment tools is growing in many countries due to a need to have systematic and standardized procedures for AT services.[32] A number of general assessment instruments were described in the literature and are outlined in Table 2; however, none were specific to EADLs and none were explicitly reflected during consultations.

Objective 2: Barriers and Facilitators to Providing Equitable Access to Assistive Technology

This objective was addressed based on findings from the literature and consultations.

The literature cites the need for funded supports, eligibility, and services for AT to be linked to human rights frameworks, and to understand and evaluate equitable access to AT through a capabilities approach.[15] This approach involves supporting opportunities where individuals can choose from a variety of AT services and devices, which address the needs and outcomes they value rather than what is valued by providers.[15] A number of barriers and facilitators relating to AT in general were described in the literature and are outlined below; yet, none were specific to EADLs. Nevertheless, several of these were echoed by consultation informants, in the context of EADLs. Many of the barriers were common among consultation programs, such as: funding, restrictive criteria, understaffing, awareness of technology, and geography. Similarly, many of the facilitators were common among programs, such as: support from family and friends, having the ability to demonstrate available products, and the accessibility of consumer products.

Funding

All consultation informants indicated that without funding, EADLs can be cost prohibitive, particularly for individuals without third-party insurance (e.g., social assistance, insurance). In addition, some funding schemes expire at the 65th birthday of an individual.

In contrast, the literature outlines that adequate funding facilitates access for long-lasting, good quality devices to meet AT needs in all areas of life.[43,44] This is echoed by 1 informant

who highlights that well-designed third-party funding schemes are facilitators to providing equitable access to ATs.

Table 2: Assessment Instruments for Assistive Technology Device and Service Provision

Instrument	Description
Assistive Technology Device Predisposition Assessment (ATD PA)[32]	**A 66-item consumer form** with items matched to the WHO ICF.[32] It is an instrument for rehabilitation professionals and people living with disabilities to assist with selecting new or additional AT devices while ensuring an appropriate consumer-technology match.[32] • Person form: 9-item inquiry on capabilities in functional areas,12-item inquiry to prioritize where they desire to have the most positive change, and 33-item inventory of consumer psychosocial and personal characteristics[32] • Device form: 12-item inquiry on consumer expectations of a particular type of AT device, and comparisons and rating of up to 3 competing devices[32] • Overall recommendations form[32] • Follow-up versions of the person form and the device form: Used to assess consumer realization of benefits, not used by consumer and to determine reasons for non-usage[32] • Companion professional forms: to gain perspectives of professionals[32] **Theoretical Model:** MPT model[32] ATD PA emerged from research on non-use and use of ATs by adult users living with various disabilities.[32] It is a systematic method for selecting AT devices for individuals living with disabilities to help decrease AT device abandonment.[32]
Assistive Technology Evaluation and Selection (ATES) Model[32]	A model to provide a standardized assessment method for AT device requests.[32]
Goal Attainment Scaling (GAS)[38]	A method of scoring the extent that a patient or client's goals are met through an intervention; it works to standardize measures of individual goals (tasks and goals that are individualized to the client) so that statistical analysis of outcomes can be performed. Originally designed for use in mental health, it has been modified for use in rehabilitation.[38]
Matching Person and Technology (MPT)[39]	A tool for matching individuals to an AT product or selection of an AT product distribution program for a region, while considering the person, context, activity, and physical and social environment to avoid poor device matching and subsequent non-use.[39] It has been found to be reliable in Australia, Canada, Ireland, and the US.[40]
Psychosocial Impact of Assistive Devices Scale (PIADS)[32]	A 26-item standardized outcomes tool to assess the impact of AT devices on well-being, quality of life, and functional independence of consumers with cross-cultural adaptability.[32]
Quebec User Evaluation of Satisfaction with Assistive Technology (Quest 2.0)[32]	A 12-item standardized outcomes tool with 8-items on AT devices and 4-items on services documenting user satisfaction with AT service provision and products.[32,41] It is intended for use by private and public services managers, researchers, and rehabilitation professionals for analysis of cost-effectiveness, cost-utility, and cost-benefit, and to improve product and service quality.[32]
Usability Scale for Assistive Technology-Computer Access (USAT-CA)[42]	Observational evaluation tool consisting of 114 usability indicators to assess the ability of individuals living with physical disabilities to access computer AT devices.[42] The tool uses the HAAT model for interviews.[42] The USAT-CA can be used to evaluate selection of computer AT device, trial AT devices, training to match skills to the demands of the device, and follow-up evaluation.[42]

AT = assistive technology; HAAT = Human Activity Assistive Technology; ICF = International Classification of Functioning, Disability, and Health; MPT = Matching Person and Technology.

Consumer Products Versus Medical Devices

Mainstream technologies such as tablets and smartphones offer features and applications that allow them to function as AT devices.[8] This opens up the market for the development of products for specific populations of people living with physical disabilities at low prices, thereby increasing their reach.[8] However, consultation informants highlighted the challenge payors face with the current definitions of consumer products and medical devices and the ensuing lack of integration. Many consumer products are less expensive, and easier to install and maintain than traditional medical-grade EADLs; yet the absence of a medical device classification usually means the device will not be fundable based on a program's criteria.[8,44,45] In such cases, the out-of-pocket cost of the consumer product may still be a barrier for people living with disability.[8,44,45]

Conversely, consumer products such as smartphones have greater uptake compared to medical-grade ATs as they are found to be more accessible, require less extensive training for the users — particularly as a disability or condition progresses or worsens[9] — and are socially acceptable to the users.[46] Adopting universally designed technologies to act in complement to AT devices may be more efficient and allow a diverse population to interact with their environments and devices without stigmatization and/or making adaptations.[44] Furthermore, as greater numbers of EADLs continue to stem from consumer products, costs will lower. Some clients, independently or perhaps with the help of family and friends, are able to access consumer product EADLs without the intervention of a clinician and without having to navigate the health care system. Furthermore, the growing mainstream nature of EADLs contributes to a normalization of ATs. The same consumer product that is used by an AT client is also used by people who do not have a disability, creating an attitude shift in terms of acceptability and reduction of stigma.

Client Funding Criteria

In some cases, consultation informants noted that some funding agencies require that a specific diagnostic criterion be met for funding, rather than basing the funding decision on an unmet need. In other cases, age (e.g., younger than 18 years, older than 65 years) is the criterion to support funding decisions.

Availability of Trained Professionals

Individuals with disabilities, particularly those in low-income households and low-resourced environments, are reported to be underserved due to a lack of access to or availability of trained professionals who can provide individually tailored support and training.[7,14,45,47] This barrier is echoed by consultation informants who indicated that many AT programs appear to lack the requisite technological support personnel for the initial setup, troubleshooting, and maintenance of EADLs as the technology evolves. These technical tasks were reported to often fall upon clinicians, which is seen as taking time away from patient-directed tasks such as follow-ups, and may result in appointments that are less thorough and that focus on the most pressing item rather than more fulsome needs. The capacity of a program to follow-up with clients is seen as a rate-limiting step. In other words, a program with a client to clinician ratio growing disproportionately will eventually be saturated and would need to refuse or delay services (e.g., device installation, client training, troubleshooting and repair) or new clients.

Conversely, informants reported that in a context of a limited number of available trained professionals, members of the client's immediate environment can facilitate access, particularly if they are knowledgeable in electronic consumer products; they are likely to seek out EADLs more readily and assist with setup, programming, and maintenance.

Awareness of AT Products and Services

A barrier to individuals accessing appropriate AT is health care providers' lack of knowledge and awareness of AT products and services.[19,45] Awareness of the benefits and availability of high-quality AT devices and services can inform user decision-making, enable earlier and wider adoption, and have support for users in obtaining AT devices, and device trialling, training, and maintenance.[9,19,30,43]

The need for knowledge and awareness is echoed by informants who report seeing a knowledge gap in clinicians working outside the specific field of AT, which is seen to result in a lack of awareness to refer clients to AT services, or a lack of awareness on the implementation of AT solutions. With EADLs gaining greater market share from the consumer product segment, and because of the rapid pace of change in this field, it may be difficult for clinicians to stay current regarding the assortment of EADL options and how to integrate them. Consultation informants reported that the complexity of integration is a real problem, and that many clinicians are not confident in their abilities, which was thought to lead to clinicians avoiding AT altogether.

Additionally, informants reported a lack of EADL education in allied health profession curricula, and as a result graduates are seen to have a limited knowledge of EADLs and ATs in general.

Informants also reported a gap in client's awareness of the assortment of EADL options available. Furthermore, few opportunities to trial equipment is observed to contribute to limited product knowledge.

Conversely, having the ability to show clients an assortment of EADLs (e.g., a demonstration suite) and permitting a trial before the commitment to a particular solution was reported to facilitate access and help clients be confident in their choice of device(s). In addition, developing classes to educate clients regarding the available technological options was observed to decrease fears around the technology.

Infrastructure and Geography

A lack of reliable access to the internet for some users is reported to limit electronic AT uptake.[46] Informants indicated that a lack of reliable internet access is a particularly important barrier in some rural and remote communities. Furthermore, AT programs are usually associated with tertiary care centre in major cities.

The literature suggests that having multiple entry points into AT provision systems may increase equity in access for potential or current AT users.[19] This is echoed by informants, who also believed that increasing the number of AT programs across jurisdictions would facilitate access to services, particularly if this were to be combined with increased service locations or support in rural or remote areas.

Quality and Cost-Effective Devices

The literature points to a lack of affordable high-quality AT products for individuals with disabilities, as an important determinant for the purchase and repair of AT devices.[8,41,47] Additionally, many AT products are available only through private purchase rather than through a public system.[8] This is echoed by 1 informant, who reported that the ability to find a good quality EADL solution that is also affordable (e.g., access and egress of dwelling) can be a barrier to access.

Programming

Consultation informants described some AT programs as siloed, which they saw as contributing to a lack of acknowledgement of the breadth of client needs and creating a barrier to access.

This sentiment is echoed by the literature which indicates that a comprehensive assessment of AT user needs, priorities, preferences, identity, environment, and context is needed in order for devices to work well, not interfere with existing treatments and supports, and suit the user's lifestyle and participation.[39,43,44] Furthermore, AT devices are often recommended without the use of a theoretical and conceptual framework.[32] The use of a theoretical model was reported as 1 strategy to guide clinical practice and research for AT.[32] Additionally, consideration is needed for changing needs for AT including across the lifespan.[44]

Technological Literacy

Consultation informants reported that a client's lack of technological literacy can limit the ability for some to troubleshoot basic issues.

Team Compositions

One informant highlighted that, in their experience, collaborative teams can often fine tune a solution for a client or come up with a better solution than individual clinicians could have found in their professional silos, thereby facilitating access.

International or National AT Provision Standards or Systems

It was reported in the literature that an international AT provision standard currently does not exist, and many countries also lack a national and/or coordinated system for AT services and funding.[8,16,45] This topic did not emerge in the consultations and it is unclear whether common standards would change access in Canada. Nonetheless, there is a desire from various Canadian stakeholders and policy-makers for the promotion of standards in services and equitable access to AT.[48]

Shared Decision-Making

The literature revealed that AT devices are often recommended by professionals without user partnership, participation, and/or perspective.[32] When personal criteria including environmental needs, and psychosocial characteristics are not considered, a technology that may have seemed appropriate can lead to it not being used or being used inappropriately and leading to resource waste.[32]

Conversely, actively involving users in decision-making processes about the devices they receive, and engaging with their preferences, has been reported to allow for greater device-client compatibility resulting in clients having greater control over their lives.[8,19,28,43,44]

Limited User Purchasing Power

With traditional medical devices, users have limited or no direct purchasing power.[8] AT product procurement is also often outsourced to third parties, and although bulk procurement by insurance companies, agencies, or governments may reduce costs, efforts, and time, it is observed to result in a greater distance between users' needs and outcomes, and purchase decisions.[8]

Limited Research Evidence

The literature, along with the GATE initiative established by WHO, emphasize 5 research priorities: costs, economic impact, and effects of AT; AT service provision models, best practices, policies, and systems; AT sector human resources; methodologies and standards for assessing; and unmet needs and ATs.[8,33,41] There are also limited data on AT outcomes and societal impact, which together have been reported to negatively impact funding accountability, service provision, and public policy assessment.[8,16,41]

Limited data specific to AT outcomes is partly due to AT being provided alongside other interventions, which makes extracting the added value of AT difficult.[8] Additionally, evaluating the impact of AT devices is complex, as the effects and outcomes are individualistic and depend on the user's personal context, ambitions, and capabilities.[8] Other reported barriers to AT research include resource allocation, limited infrastructure and time, privacy issues, and consumer attitudes.[41]

Objective 3: Jurisdictional Funding Approaches of Assistive Technology Programs

This objective was informed based on findings from the literature and consultations.

Funding Mechanisms, Eligibility Criteria, Type of Devices Covered, and Extent of Coverage for EADL Devices

Canadian Jurisdictions

Nine consultation informants from 4 Canadian provinces (Alberta, n = 1; Manitoba, n = 1; New Brunswick, n = 2; Nova Scotia, n = 2), 1 federal health care plan, and 2 academic institutions provided information on funding mechanisms, eligibility criteria, type of devices covered, and extent of coverage for EADL devices.

Funding Mechanism

One informant from an AT program at a tertiary rehabilitation hospital[10] explained that assessment and ongoing monitoring and support is funded by Alberta provincial health funding. Furthermore, client equipment is funded in a variety of ways, including Alberta Aids to Daily Living,[49] which will pay 75% of costs while individuals pay a cost share of 25% up to $500 per family per benefit year (July 1 to June 30). The program pays the balance of the cost of the benefit based on an approved product list,[50] which includes speech generating communication devices for individuals who cannot meet their daily communication needs using speech.[34] Low-income families may be exempt from paying the cost share portion, but may still have to pay for upgrades.[34] Other funding sources include private insurance, Workers' Compensation Board of Alberta, Veterans' Affairs Canada, charitable associations such as the Amyotrophic Lateral Sclerosis (ALS) Society of Canada,[51] the Cerebral Palsy Alberta Association,[52] or a local chapter of a community service club (e.g., Lions Clubs International).

Another informant from an AT communication devices program at a rehabilitation and long-term care centre,[11] reported that their specific communication program is fully funded for assessment and device provision through the Manitoba Department of Families,[53] instead of the Manitoba Ministry of Health and Seniors Care. The program's approximate budget is $600,000 per year, for approximately 150 to 175 client referrals per year, approximately 50% of which end up agreeing to, and benefit from, a communication device. Following a trial period, the device is rented long-term at a flat rate of $20 a month regardless of the device type. Recipients of governmental Employment and Income Assistance,[54] have their rental

fee reimbursed by that program. Similarly, other programs (e.g., Manitoba Public Insurance,[55] Workers Compensation Board of Manitoba[56]) either pay the rental fee or purchase the device privately. For clients paying out-of-pocket, the monthly fee is usually seen as an advantage over a large upfront purchase cost. About 300 clients use the rental program currently. There is a dedicated portion of the budget for staff to participate in training and education and international conferences. The program also has an academic mandate whereby they provide education to the rehabilitation assistance school, OT college, any other programs that wish education on ATs.

Two informants from the AT services of a provincial tertiary rehabilitation facility[12] described the availability of funding through the Disability Support Program of the New Brunswick Ministry of Social Development, which offers funding for "technical supports and assistive devices not covered under other programs."[57] Institutional donations, such as the Stan Cassidy Foundation,[58] can also contribute up to $300 per person per year in a "care and comfort" fund for clients of their rehabilitation centre. Program team members will often network with other autonomous, community-based, and non-profit organizations to identify other funding sources. For instance Abilities New Brunswick,[59] Muscular Dystrophy Canada,[60] and Easter Seals New Brunswick,[61] can help identify other coverage sources, including opportunities from private foundations. This stream of funding is particularly useful for individuals who do not receive government funding, but who don't have the ability for out-of-pocket expenses. Since home controls are now mainstream consumer products, gifts of used equipment from family and friends is another manner by which clients sometimes obtain the necessary components, which could then be customized by their local rehabilitation program. In addition, loan programs are another mechanism to provide devices to those in need. Trial, short-term, and long-term loans can be provided by loan programs operated by Easter Seals New Brunswick,[61] or the ALS Society of Canada.[51] The program also relies on the donations of gently used equipment that is then provided to clients who need them.

Two informants from the AT services of a provincial tertiary rehabilitation centre[13] reported being funded for the staffing of their program only. Devices are donations from charities and foundations. Their demonstration suite was funded through the hospital foundation and community donors. Although this program offers device trials, once an ideal EADL solution is identified, it is up to the client to fund it, either personally, through community fundraising, employer sponsorship, community services, or other means.[62] Alternatively, there are community organizations (e.g., Neil Squire Society)[35] that operate loan programs for clients in need.

From the perspective of a federal health care plan payor, EADLs are funded under the Program of Choice 13 – Equipment.[63] No budgetary annual cap was reported. Funding continues until death, clinical improvement, or changes to the setting such that the device is no longer needed. The payor reported that the program will also reimburse rentals if requested.

Additionally, 1 academic researcher provided information on the TIL program[17] in British Columbia, which provides devices on a loan basis with no user fees. While they are run as a not-for-profit, they receive government funding to purchase assistive devices. They also undertake fundraising to finance their operation.

One 2017 Canadian report specific to AT[6] highlights the lack of consensus on the term's definitions among payors. Some of the funding programs include EADLs, while others do not. Authors document a comprehensive list of programs from the 10 provinces, 3 territories, and the federal level. Some were government programs (e.g., Programs of Choice

13 − Equipment by Veteran Affairs Canada, Correctional Services Canada, Alberta Aids to Daily Living, Nova Scotia's Disability Support Program) and others were charity programs (e.g., War Amps, Rotary International, Muscular Dystrophy Canada, March of Dimes Canada). At the time of writing, some programs offered full funding, while others shared the cost with the client. Eligibility criteria range widely, including residency status, age, type of disability, and demonstrated financial need. Types of EADLs funded include hearing, vision, and communication devices, tablets and software applications, environmental control units, yet other programs have no device type restrictions as long as the need is demonstrated. Readers are encouraged to consult the report for a comprehensive list of federal, provincial, and private funders.[6] Information on funding and service programs across Canada is also available in a searchable database.[20]

Eligibility Criteria for Funding

Two informants from the AT services of a provincial tertiary rehabilitation facility[12] described the criterion for client funding eligibility to be a demonstrated financial need (e.g., receiving income assistance through the social assistance program).

From the perspective of a federal health care plan, eligibility for funding is specific to the member's individual level of benefit and service.[63] The need for the requested AT must be clearly demonstrated, for example a member may have a disability entitlement for a specific functional disability. Hence, ATs not directly related to the specific disability would not be considered by the plan to be required and therefore would not be funded. In addition, and whenever possible, the plan requires that a member demonstrates that a more basic intervention (e.g., a paper calendar for time management) has been trialled and was not sufficient before graduating to an EADL solution (e.g., an electronic calendar for time management).

Additionally, 1 academic researcher provided information on the TIL program[17] in British Columbia where funding is provided on the basis of a recommendation from the client's community therapist.

Types of Devices Funded

All informants agreed that EADLs perform a variety of functions that are often grouped into broad categories: emergency call system; home control; access and egress; and access to the external world, including communication aids. Further detail regarding funding of those devices was provided.

One informant from an AT program at a tertiary rehabilitation hospital[10] indicated that 1 criterion for reimbursement is that the technology has to be released for at least a year before it is added to the list of approved ATs for reimbursement. Communication devices, device mounts, and some software applications are the only publicly funded EADL under the AT program. Such devices may also allow for extra features (e.g., alerting, distance communication). Specialized access equipment (e.g., head-operated mouse, eye gaze camera, mounting equipment) is funded by Alberta Aids to Daily Living if it is needed to access a communication device; however, funding is not provided if it is needed for computer access or environmental control separate from a communication device.

Another informant from an AT communication devices program at a rehabilitation and long-term care centre[11] reported that the program is focused on finding the most appropriate EADL for the client. It is the responsibility of the program to justify the rationale for the clinical recommendation regardless of the cost of the device. While they include all the device

categories listed previously, the type of device funded is based on the client's need, not on a list of approved choices or limited by a fiscal budget cap.

One informant from the AT services of a provincial tertiary rehabilitation facility[12] described the addition of consumer products to the categories listed by all informants, particularly smart home products. In addition, their program reimburses specialized custom-made products, produced in-house with a 3-dimentional printer. Here, too, the type of device funded is based on the client's need, not on a list of approved choices. A letter of support is often the only criterion for eligibility, particularly with third-party payors or charity organizations.

From the perspective of a federal health care plan, funding is limited to the most basic version or model of a device that would meet the member's need. If the member wishes an upgraded version or model of a device, the member must pay the cost difference. Devices such as emergency communication systems (e.g., Lifeline brand), anti-wandering equipment, computers and robotics equipment and accessories, are funded to enable the performance of essential or instrumental activities of daily living, but generally not for leisure purposes. Computers and robotics equipment and accessories are limited to enhancing communication, enhancing sensory perception, or health security monitoring.

One academic researcher provided information on 2 British Columbia AT programs. The TIL program[17] funds an assortment of devices from older switch access type systems to modern consumer products, and access and egress systems. The CAYA program[18] focuses on communication devices which may or may not include EADL functions. If a communication device can also integrate EADL features, that is considered added value to the client, but it is not the focus of the program.

Extent of Funding

There is a lot of variability regarding the extent of funding. Some programs fund device customization, repair, and replacement; whereas, others consider a device a one-time expense, where maintenance and repair are the responsibility of the device user.

One informant from an AT program at a tertiary rehabilitation hospital[10] indicated that education and training of personnel with new devices and client training is included in the funding. Furthermore, device customization is considered part of EADLs and is funded. Also included are basic maintenance and repair done in-house and by the program where possible, failing which, the device is shipped to the manufacturer for repair. This is similar to the AT communication devices program at a rehabilitation and long-term care centre,[11] where their rental program funds the cost of basic maintenance and repairs performed in-house by the electronic technologist, when possible. If the repair requires a part replacement (i.e., a part that is available to consumers, such as a tablet screen), the part is billed to the client, but the labour of the repair is funded by the program. If the damage is to a non-serviceable part of the device, then a replacement is provided. A loaner device is provided to the client while the repair is performed. Instances of device loss or theft are not funded, and device replacement in these circumstances is at the client's expense.

One informant from the AT services of a provincial tertiary rehabilitation facility[12] noted that funding requests are singular events with no mechanism to fund changes that may come from a reassessment. Therefore, once a device is procured, any changes resulting from a reassessment would require a new source of funding. Furthermore, their program does not fund device maintenance or repair. However, if the equipment is on loan, the loan program administrator would take care of maintenance and repair. In addition, the program

does not have a budget for training staff or for user setup, therefore they often rely on the installation service of consumer product vendors, such as the in-house experts provided at a point of sale.

From the perspective of a federal health care plan, EADLs are classified as computers and robotics and are considered as an open benefit with no per year frequency or cost limits. Other categories of assistive devices may have frequency limits (e.g., 1 every 3 years, 1 every 5 years). Most EADLs will have funding limited to the basic version or model of the device with no upgrades; however, the member can choose to pay the difference out-of-pocket if they wish to upgrade the device. The plan administrator will fund time spent training the client, family, or caregivers with a new device. If the device was procured by the plan administrator, repairs and maintenance (after any manufacturer warranties are exhausted) are funded. If the device was acquired before the member's adherence to the plan, and an assessment by the plan administrator reveals it is still the best solution for the client, then the plan administrator may accept to fund ongoing maintenance costs.

Additionally, 1 academic researcher provided information on the CAYA program[18] in British Columbia and reported that device maintenance and repair are funded since it is a loan program.

Other Jurisdictions

In a 2005 joint survey by WHO and the United States Agency for International Development on AT services and funding, one-third of surveyed countries did not have financial resources allocated to developing and providing AT products or services.[8] Where a budget was allocated, funding ranged from full to partial coverage of AT costs for a limited list of assistive products.[8] Some countries had a voucher or personal budget system where users were given choices within an AT product and/or specific price range.[8,28] Additionally, in most countries, determination of AT eligibility relied on clinical diagnostic criteria and definitions.[8] A need for eligibility models was reported, which would come from a functional perspective and consider the user's context, ambitions, and participation in society to distribute available resources fairly and equitably regardless of the funding mechanisms chosen.[8]

Information found within the literature on funding mechanisms and eligibility criteria for various jurisdictions are outlined in Table 3.

Objective 4: Other Jurisdictional Decision-Making Approaches to Funding of Basic and Essential Assistive Technology Devices

This objective was informed based on findings from the consultations.

Key Factors and Considerations That Determine an Essential EADL

No literature was identified regarding any specific key factors and considerations that determine an essential EADL for individuals. Five consultation informants from 1 Canadian province (New Brunswick, n = 2), 1 federal health care plan, and 2 academic institutions provided information on key factors and considerations that determine an essential EADL.

Two informants from the AT services of a provincial tertiary rehabilitation facility[12] described that the only criterion that many funders use to determine whether a product is eligible as an EADL is a letter of justification from the AT team. The AT team describes the necessity of the device in terms of how the EADL will improve independence, decrease caregiver hours,

Table 3: Funding Mechanisms, Criteria, and Coverage of Assistive Technologies

Country	Funding sources	Type of AT covered and extent of coverage	Funding mechanisms, criteria, and considerations
Australia	National Disability Insurance Scheme (NDIS)[46]	Unknown	The recent operationalization of the NDIS means those without compensation may be able to register and potentially access funding for necessary and reasonable supports such as electronic AT.[46] NDIS is estimated to provide AT as 1 of several supports to approximately 450,000 eligible Australians, and will fund a subset of users needing AT.[44] The NDIS provides AT devices and services as 1 of multiple funded supports for individuals plans.[44] Funding approval for complex or specialized AT requires a detailed report for the requested AT.[44]
	Government	Australia had a total AT expenditure of AU$595 million in 2013, which supports 927,000 Australians from over 90 program that receive government funding.[44] Each program provides subsidized equipment and aids, and vehicle and home modifications.[44] Full funding for at home Environmental Control Systems (ECS) that control end devices including entertainment units (DVD and TV), electric beds, and personal alarms.[14] Public funding for AT does not extend to phones and computers that can be customized for communication needs.[19,44]	In Australia, each territory and state government supports AT device provision and services.[44] In Victoria, there is the State-Wide Equipment Program, which is composed of 9 programs each with different eligibility guidelines equipment options, follow-up arrangements, and capped subsidies.[44] In Queensland, a Government sponsored program or insurance provided funding and the prescription may be overseen by a health professional (e.g., OT).[14] Eligibility for funding and subsidies include individuals living with a range of physical disabilities.[14] The time frames for prescription process, trial, and assessment of ECS are developed to suit prescribers, hospital and funding organizations, which are likely not ideal for ECS users.[14]
	Not-for-profit, social enterprises in Australia (funded by a consortium of philanthropists and private organizations)[64]	At Home Grants Scheme: capped, one-off individual funding ranging from AU$100 to AU$10,000.[64] Requests for funding included: • Home modifications (bathroom and kitchen changes) • Lowering and lifting devices • Climate control devices (air conditioning) • Contemporary communication technology devices.[64]	Australian not-for-profits are establishing micro-grants for individuals with complex disabilities to purchase essential aids and equipment for adults between 18 and 65 years old not accessible through other public or private funding schemes including NDIS.[64] Selection criteria also include: applicants at risk of entry into a residential aged care facility; extent of applicant's needs for care; and extent to which the item will support the applicant in remaining at home, improve quality of life, complement current support and service provision, improve access to the community, and have a long-term impact on the applicant's life.[64]

Country	Funding sources	Type of AT covered and extent of coverage	Funding mechanisms, criteria, and considerations
Finland	NR	NR	Finnish citizens have a right to receive AT devices at no cost if they face difficulty in their functional abilities or participation due to medically grounded disabilities and illnesses.[24]
Republic of Korea	Government Sector • Ministry of Health and Welfare (Department of Rehabilitation, National Health Insurance) • Ministry of Employment and Labor (Workers' Compensation, Employment Agency for the disabled) • Veterans Affairs • Ministry of Science, ICT, and Future Planning (National Information Society Agency)	From a 2014 internal database system of 14,056 client service cases, the Ministry of Health and Welfare provided full funding for 1,744 service cases for Activities for Daily Living Aids.[27] There was partial funding for 212 service cases for computer access, 37 service cases for augmentative and alternative communication systems, and 214 service cases for housing modification.[27]	Public funding for AT in 2014 was 1,781 billion won ($1.7 billion US), an increase of 27% from the previous 5 years.[27] AT service in the Republic of Korea is a provider-oriented service lacking individual, comprehensive approaches for AT selection, acquisition, and use.[27]
US	• Medicaid • Medicare • Private insurance companies • Schools	Substantial funding for electronic AT devices is often not available through insurance, state, or federal programs.[47]	Medicaid, Medicare, private insurance, and schools consider objective data before signing for AT payments.[41] The durable medical equipment criteria are used to justify funding based on medical necessity instead of environmental, functional, or personal necessity.[41] Individuals with workers compensation are more likely to receive funding for AT compared to those with private or government insurance.[47] Current funding policies negatively impact practice, particularly when high-cost, complex technologies are cost prohibitive for many users if they have to pay out-of-pocket.[41] One study found that usage pattern information can assist providers in stock planning for AT device libraries, anticipate AT device needs, or assist with applying for funding if extended use is needed.[65]

AT = assistive technology; ECS = Environmental Control Systems; NR = not reported.

and improve the client's ability to socialize and interact with others. Furthermore, because this facility has a demonstration suite, they are usually able to state that the client has tried a variety of different EADL options, and an optimal solution was identified.

From the perspective of a federal health care plan, the criteria defining an EADL are deliberately left open and general to allow for discretion and latitude in what to fund. When in doubt, decision-makers consult with plan administrator OTs to help determine if an item is an eligible benefit and which Program of Choice would be best suited for reimbursement if not Program of Choice 13 – Equipment.

One academic researcher indicated that the principles that should guide the funding of EADLs is whether or not the device allows the client to achieve personal functional outcomes and desired goals to their satisfaction. Using functional outcomes to determine the necessity of an EADL was felt to be an equitable and opportunity-oriented approach to funding, versus restricting funding to a specific device category.

Another academic researcher recalls Canada's responsibilities as a partner in the WHO's GATE program.[66] The GATE program includes some EADLs on the Priority Assistive Product List, a list that has been determined to be the bare minimum of what countries should provide to their citizens who require them.

Limitations

The findings of this Environmental Scan present a broad overview of funding and access to EADLs for adults with physical disabilities that limit mobility and functioning and are based on consultations and a limited literature review. It is not an exhaustive review of the topic and while information on a range of technologies and disabilities was identified, not all relevant technologies or all disabilities are represented. There may be funding programs across Canada or internationally that were not well-documented either in the literature or online, and therefore were not captured in this report. Consultations were held with stakeholders identified by CADTH within the time frame, and it is likely that not all relevant stakeholders were identified and contacted. This could potentially create a gap in information regarding funding and access to EADLs. Most of the identified literature discussed AT programs in jurisdictions outside of Canada, potentially limiting the transferability of the findings to the Canadian context. Furthermore, most of the included publications generally discussed AT devices and service provision, with a lack of available information specific to EADL devices.

Conclusions and Implications for Decision- or Policy-Making

This Environmental Scan was informed by literature searches and consultations and gathered information on the organization and funding mechanisms of Canadian and international service programs that provide access to EADLs to individuals with physical disabilities. It is important to note that this report is a reflection of the state at the time of literature publication

and expert consultations, and these service programs, eligibility criteria, and funding criteria are evolving; as such, our findings may have limited permanence.

Essential components of existing AT programs were identified and described. Multidisciplinary teams, generally comprised of OT, SLP, SLP assistants, and biomedical engineers, for AT service provision were recurring in programs, including having professionals trained in AT service provision to ensure the integration of client needs and priorities and provide training to clients to maintain their device, thereby optimizing the use of AT devices. Furthermore, many programs require that an individual must have someone in their environment for that initial setup and ongoing device assistance, of particular relevance for those in remote settings.

Within service delivery structures, common steps exist among Canadian programs. Common steps also exist with the identified international programs using a national and/or multi-level coordinated service delivery system. Several AT service frameworks, criteria, and assessment tools exist to support the development and implementation of service structures; however, the literature is lacking with respect to the application of said assessments to existing AT service programs. Consultations revealed that, in practice, no single assessment tool is followed exactly, and tools are often adapted using the clinician's professional judgment to provide a better picture of individual needs.

Various barriers were reported to providing users with equitable access to AT service programs including affordability, awareness of AT devices, adequate training through AT service providers, and limited client participation and purchasing power in AT decision-making. In addition, transition of services after age 65 was noted to often create a gap in care while new funding sources need to be identified. Conversely, facilitators that were reported to address these concerns include a comprehensive assessment of client needs to ensure the provision of compatible AT, and supports for accessing AT provision systems including funding and information databases. In addition, access to most programs can be through self-referral, although a health care provider referral was reported as preferred by all identified programs.

Most identified programs have some public (i.e., provincial or federal), or local funding by charities. Similarly, clients have access to some public or charity funding for devices. However, a small proportion of clients rely on foundational grants, fundraising efforts, or donations. Consultation results highlighted that while funding does exist, there is a need for effective integration between agencies, systems, ministries, and funding sources. Furthermore, siloed funding was observed to leave a gap (e.g., age-related eligibility, those who are not eligible for third-party insurance and yet cannot afford out-of-pocket expenses). In contrast, some international jurisdictions (e.g., Australia, Norway, Sweden) fund ATs through their existing health care system insurance scheme.

No single terminology for EADLs emerged from the literature or consultations, creating difficulty for jurisdictional decision-makers to equitably approach the funding of basic and essential AT devices. Some refer to all electronic devices simply as ATs, other prefer the distinction afforded by the term EADL. Additional terminology used to describe technology that can help users in their daily lives included ambient assisted living technology,[67] welfare technology,[67] and electronic AT.[68] In addition, no clear definition of what constitutes an EADL emerged from the literature or consultations, indicating that debate still exists, and additional consensus is needed to clearly circumscribe the concept. This will complicate the task of decision-makers who rely on electronic device classifications to determine eligibility.

Alternatively, decision-makers could follow some jurisdictions that chose to reimburse any electronic device (medical-grade or commercial product), so long as it allowed the client to meet their desired functional outcomes.

According to findings from the literature and consultations, user-centred approaches to AT service provision including consideration of preferences, context, and psychosocial factors, supports equitable access and implementation of AT devices. This is highlighted in a Swedish pilot project geared toward increasing client's freedom of choice in the selection of their device.[28] While not in scope for this review, there has been study of the perspectives and experiences of those using EADL and ATs, such as environmental control units (ECU).[14,69,70] Devices such as ECUs have been found to be well-accepted and to increase perceptions of independence[69] and that for some clients with spinal cord injuries, small changes in activity levels can have important meaning — particularly for those with more severe injuries.[71] Similar to the findings of this report, factors such as client readiness, client's personal values, the reliability of the technologies (particularly those that control functions important to safety — such as doors), and proficiency with the technologies for both the care provider and client have been found to be important to the successful use of ECUs in studies of user perspectives as well.[14,69,70]

Decision-making approaches to funding of basic and essential AT devices is varied across Canada. Many decision-makers rely on open and general criteria and "letters of justification" from a client's care team to base their decisions. For some, this has been perceived as creating ambivalence around client and device eligibility, and for others has been perceived as a user-centred approach allowing for individual factors to be considered.

As previously noted in the limitations, the descriptions provided in this report are based on findings from the literature and stakeholder consultations. There is a lack of consensus as to how to define EADLs, who should be eligible for EADLs, and how they should be funded — as demonstrated by the heterogenous findings in both the literature and consultations. There is limited literature on electronic specific ATs and EADL programs. Findings do not present the validity and reliability of the service delivery selection and assessment organizations and tools. Further work is needed to provide evidence to understand and support the effectiveness of AT service delivery processes, and support AT eligibility criteria and funding decisions, particularly in the context of EADLs.

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Appendix 1: Consultation Questionnaire

Introduction and Project Overview

- Participant introductions.
- Obtain consent to record the session and use responses, in aggregate form or direct quotations, in the publicly accessible final report.
- CADTH team provides an overview of the project (including context and key definitions), outlines the purpose and objectives of the consultations, and describes the final product.

Core Questions

A: Funding and Components of Electronics Aids to Daily Living Programs

1. In your jurisdiction or context, how is Electronic Aids to Daily Living (EADL) defined/understood?

   a. What are examples of devices and technologies that are included/excluded under the definition/understanding of EADLs in your jurisdiction or context?

   b. Is device customization (for example, programming or modifying the device using customized switches or controls to address the individual's physical needs) considered part of EADL in your jurisdiction/program?

2. Is there a publicly funded program or service in your jurisdiction that provides access to EADLs? (* If no program or service exist or if you are unsatisfied with the EADL program in your jurisdiction, is there another program that you would recommend as having ideal/essential components that an EADL program could model?) If yes, could you provide some details about the program or service, including:

   a. Are EADLs covered under a dedicated program or through other assistive technology programs?

   b. What EADL products or services are available? (can probe regarding the categories of EADL, perhaps they also have their own definition of EADL)

   c. What criteria are used to determine whether a product is eligible as EADL? (examples of probes – are smart home technologies such as controlling TV, fans considered EADL? Only stand-alone units and custom environmental control systems?)

   d. How do EADL users access the program? What are the eligibility criteria for users (e.g., financial level, diagnosis, budget cap for purchase of EADL, etc.)?

   e. How are the needs of EADL users assessed? What types of assessment methods are used?

   f. Is there a process for EADL users to trial various devices or have customized EADL options, or do they all receive the same type of equipment?

   g. How is the program funded?

   h. What is the annual budget of the program?

   i. How many team members (i.e., full-time equivalencies) are involved in providing the services related to EADLs? How is the team structured? What are the different competencies, functions, and roles of team members?

   j. What type of follow-up processes and infrastructure does the program have in place

to ensure that the EADLs meet the users' needs? What is the process for evaluation of function, satisfaction or value to the consumer of the EADL - are these standardized or non-standardized measures? Is there a budget and/or process for maintaining, repairing their equipment?

B: Barriers and Facilitators Impacting Access to Assistive Technologies

1. Based on your experience, what are the main barriers to access to EADLs?

2. Based on your experience, what are the main enablers or facilitators of access to EADLs?

C: Opportunity for Discussion and Questions

1. Is there anything else that you would like to note regarding EADLs in your jurisdiction?

2. Do you have any questions for CADTH?

Appendix 2: Additional Data

Table 4: Resources and Tools from Professional Organizations to Guide Assistive Technology Service Provision

Organizations and tools	Description
Organizations	
Association for Advancement of Assistive Technology in Europe (AAATE)[8]	Professional organization that conducts AT research, practice, and policy, and outlines 6 general quality criteria for AT service delivery of: accessibility, competence, coordination, efficiency, flexibility, and user influence.[8]
Australian Rehabilitation and Assistive Technology Association (ARATA)[8]	Professional organization for advancing and promoting assistive technologies and professional training.[8]
Community Equipment Code of Practice Scheme (CECOPS)[7]	UK-based professional organization that provides AT training using an outcome-based credentialing framework, and a quality framework based on sustainability indicators, which includes monitoring methods and tools, outcomes measurement, and service provision and procurement standards.[7]
International Association of Accessibility Professionals (IAAP)[7]	Professional organization which has competency-based frameworks for AT personnel, which are paired with training and education programs.[7]
Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Practice Guidelines[7,41]	Professional organization that has guidelines for provision of skills and knowledge for specialty technology, and competency-based frameworks that are paired with training and education programs for AT personnel.[7,41]
Tools for assistive technology service provision	
AskSARA[19]	A self-assessment tool hosted by the UK Disabled Living Foundation, which combines AT databases with problem-based search functions where users choose an activity or topic, and answer questions.[19] The tool then generates individual reports given to users on common AT devices and contact information of local services.[19]
Assistive Technology Device Classification (ATDC)[41]	An ISO 9999:2011 and ICF-based tool for identifying and acquiring specific AT products.[39,44] ATDC uses information from AT assessments to identify AT products including those from the Priority Assistive Product Listing and other AT products identified from each nation.[39] Appropriate AT product selection occurs through consideration of environmental factors including physical environmental, psychosocial factors, and usability of the product in the user's context.[39,41] The ATDC also distinguishes between universally designed and medical AT.[41]
Assistive Technology Service Method (ATSM)[16,41,8]	An ICF-based standard of process for use across various professions, disabilities and AT service provision, policy, and practice contexts using a person-centred approach.[16,41,8] It is a well-stated model in international contexts and is intended to work with existing professional practice standards.[39] With this method, AT provision starts with an assessment of the environment and person, establishment of an ability and disability baseline, and the development of a strategy for intervention.[39] AT products are then identified, selected, and obtained.[39]
Horizontal European Activities in Rehabilitation Technology (HEART) Study[16]	Classified criteria for initiative, typology, assessment, selection, delivery, and follow-up/management of AT.[16]

Organizations and tools	Description
Human, Activity, Assistive Technology (HAAT) Model[39]	A model with key domains to consider during AT product selection including if the AT is used with the individual that encounters performance limitations in their activities, and consideration of personal and contextual factors, user finances, and type of social support.[39,40]
IMPACT^2 Model[44]	A conceptual and process framework describing theoretical relationships of key AT intervention approaches used for optimizing function of people with disabilities.[44] It considers the contextual and personal factors, and concurrent interventions in which AT devices and services are in practice, while providing a framework for costing AT services (including training, evaluation, maintenance, and follow-up services).[44]
International Classification of Functioning (ICF)[8]	Framework used for measuring health and disability and decision-making for ATs.[8]
Institute on Matching Person Technology (MPT)[41]	Compendium of instruments for matching the consumer to the AT device, and outcomes tools for various contexts of AT device provision.[41]
Quality Indicators of Assistive Technology[41]	Framework for quality of AT services.[41]
WHO Disability Assessment Schedule 2.0 (WHODAS 2.0)[8]	General assessment instrument for disability and health used for decision-making for ATs.[8]

AT = assistive technology; ICF = International Classification of Functioning; ISO = International Organization for Standardization.