

CLINICAL NOTES

I N N O V A T I V E H E A L T H C A R E S O L U T I O N S

The Wheelchair Outcome Measure: A client-specific assessment of wheelchair intervention

By William B. Mortenson, BScOT, MSc, and William C. Miller, BScOT, MSc(OT), PhD

Given the rapid increase in wheelchair seating and mobility technology, it is often difficult for wheelchair prescribers to decide which wheelchair best meets a user's needs. Sometimes only a simple change in positioning or cushion is required. In other circumstances, a complete new wheelchair system, which represents a complex and carefully selected combination of the most appropriate wheelchair and wheelchair seating components, is necessary. As well, many funding agencies have begun to require concrete evidence to support equipment-prescription choices. Because of demands for increasing health care accountability and because of the lack of an individualized, goal-oriented measure of outcome after wheelchair prescription, the Wheelchair Outcome Measure (WhOM) was developed.

The WhOM is a tool that enables the outcomes of wheelchair intervention to be quanti-

fied and that provides meaningful information to therapists, clients, administrators and funding agencies. It is applicable to new wheelchair users and to individuals transitioning to new wheelchair systems. It can be used to evaluate the effect of specific wheelchair components (such as back supports or wheelchair cushions), complete wheelchair systems (which include the wheelchair frame and specific wheelchair components), or other interventions (such as education or environmental modification). This article describes the development of the WhOM and presents a case study that demonstrates its use.

A complex process

Wheelchair prescription and intervention represents a complex process that involves careful consideration of a person, that person's environment and the wheelchair technology

available. Appropriate wheelchair prescription and intervention enables participation in valued activities, facilitates social interaction and improves quality of life. Inappropriate wheelchair prescription and intervention, however, can limit independence, cause discomfort, and contribute to skin breakdown. Such problems may ultimately lead to wheelchair abandonment.

A number of wheelchair assessment tools are currently available, but none measure a wheelchair user's participation in self-selected, daily activities. Most instruments target rudimentary outcomes such as pain or positioning. Some instruments measure wheelchair skills, which include applying brakes and doing "wheelies," in carefully controlled settings. Very few look at participation: what individuals

continued on page 2

No more accidents: Changing how we think about injuries

By Marguerite Thomas, RN, BScN

Your injured client has had an accident and comes in for treatment for a bad leg. Stop! What's wrong with that first sentence? Can your client's leg be "bad," either moral or immoral? What about the word "accident"? Are most injuries simple accidental acts of fate or are they incidents that are predictable and preventable? Should you just focus on treating the current injury without worrying about preventing future injuries?

A financial burden

According to Smartrisk, Canada's injury prevention organization, preventing injuries makes financial sense. Each year in Canada, the total cost of unintentional injury amounts to \$8.7 billion. Ontario accounts for over one-third of this cost at \$2.9 billion. Falls generated about 44 per cent of the total cost followed by motor vehicle crashes (19 per cent) and poisonings (five per cent).

continued on page 9

INSIDE

- Custom contoured seating:**
Where do I start? **4**
.....
- Setting new criteria:**
The Wheelchair Seating
Posture Measurement
Standard **6**
.....
- Conductive education:**
A growing approach
to rehabilitation **8**
.....
- Arthritis prevention and care:**
New standards
for Canadians **10**

The WhOM *continued from cover*

actually do in their daily lives. Although a number of non-wheelchair specific, participation instruments have been developed, clinical experience and research evidence suggest that these generic tools fail to capture the nuances of wheelchair participation required for proper prescription and intervention.

Development of the WhOM

To establish the questions and format of the WhOM, qualitative interviews were conducted with 34 individuals. Participants represented (a) an international and multi-disciplinary group of expert wheelchair prescribers, which included physiotherapists and occupational therapists from Canada and the United States, and (b) a diverse group of adult manual or power wheelchair users and their associates (family members, caregivers and friends).

The instrument

The WhOM consists of two sections. Section one includes two questions that identify the participation outcomes clients want to achieve (a) at home and (b) outside and in the community. Some examples of “at home” activity goals include being able to do light housework, parenting or bathing. Examples of “outside/community” goals include being able to go for coffee with friends or visiting the doctor. Section two consists of three questions that address common fundamental concerns (e.g., comfort in the wheelchair, positioning, and history of pressure sores) that wheelchair prescribers and users felt were essential factors to consider for wheelchair prescription.

For each goal that is identified in section one, the wheelchair user rates (a) the importance of the activity goal and (b) their satisfaction with performance of it on a scale from 0-10. For each goal, the importance scores and satisfaction scores are multiplied and added together to create an overall satisfaction with performance score. Because the importance score is used to weight the satisfaction score, activities that are more important will contribute more to the overall score. When the WhOM is re-administered, the wheelchair user rates their satisfaction with performance again, and this score is multiplied by the importance score, which was determined when the WhOM was first administered. Changes in satisfaction with performance of individual activities or for the overall change score can then be examined. In section two, comfort, satisfaction with positioning and self-

perceived severity of skin breakdown (if present) is also rated on a scale from 0-10.

As the WhOM uses a semi-structured interview format to identify and prioritize the outcomes that clients want to achieve, the prescriber has the opportunity to probe for additional information. For example, a client may indicate that his or her wheelchair is required to “do everything,” but the prescriber should use additional prompts to uncover specifics about what “everything” means to this particular individual.

Finding the right system

Yvette is a 56-year-old woman with multiple sclerosis. She has been using a scooter for the last seven years, but a recent exacerbation of her multiple sclerosis has left her much more fatigued, and she is having increased difficulty sitting up in the scooter. Previously, she was able to walk short distances in her apartment, but now she is using her scooter indoors. She is reluctant to use a power wheelchair, but she can no longer do the things she wants to do.

Yvette has tried three power wheelchairs. She is having difficulty deciding among them, as she cannot recall how each chair performed. One feature she was really taken with is a seat elevation system (which allows her to raise her seat up and down in space), but you suspect her funding agency will not cover it.

The WhOM offers prescribers a standardized

and objective tool with which to address these issues. For ease of presentation, an excerpt of section one (measuring outside/community goals) is provided (see Figures 1 and 2).

Upon initial administration of the WhOM, you learn Yvette’s most important goals and get her to rate their importance on a scale from 0-10. As indicated in the excerpt, these community activities include banking, grocery shopping and walking her dog. As you progress with the WhOM, Yvette rates her current level of satisfaction with performing these activities while using her scooter. You discover that she is not very satisfied with either her ability to perform these activities or her comfort and positioning.

Now you let Yvette trial the three wheelchairs again, but this time you get her to complete the WhOM for each. With wheelchair system two (power chair with pressure reduction cushion and personal back), Yvette experiences a marked improvement in her satisfaction with performing her self-identified activities and with her comfort and positioning. With wheelchair system three (the same power chair with the addition of a tilt-in-space feature), she indicates even greater satisfaction with her performance, comfort and positioning. With wheelchair system four (power chair with seat elevation and tilt), she reports her highest levels of satisfaction with her ability to shop and bank, as she is now able to reach and access items on

Figure 1 Sample WhOM measurement, part one

2. Some people use their wheelchairs because they want to participate in activities outside of their home such as dog walking or going for coffee, to work or to the park. What activities **outside of your home or in your community** would you use your wheelchair to perform?

Use this numerical scale to help fill in the table: 0 1 2 3 4 5 6 7 8 9 10					
Initial assessment Date:		Current wheelchair system (Scooter)		Wheelchair system two (power chair with pressure reduction cushion and personal back)	
Participation goals:	Importance How important is this activity to you? (0-10) 0 = Not at all important 10 = Extremely important	Satisfaction 1 How satisfied are you with your current level of performance of this activity? (0-10) 0 = Not satisfied at all 10 = Extremely satisfied	Importance x Satisfaction 1	Satisfaction 2 How satisfied are you with your current level of performance of this activity? (0-10) 0 = Not satisfied at all 10 = Extremely satisfied	Importance x Satisfaction 2
i. Banking	7	2	14	5	35
ii. Shopping	8	3	24	5	40
iii. Taking dog for walks	8	1	8	6	48
		Total of importance x satisfaction 1 scores = 46 Comfort = 3 ¹ Positioning = 9		Total of importance x satisfaction 2 scores = 123 Comfort = 7 Positioning = 8	
Change in satisfaction = Score 2 123 - Score 1 46 = 77					

higher shelves, can use the bank machine and can interact with people at eye level. Her satisfaction with dog walking, comfort and positioning remains the same as she achieved with wheelchair system three.

This information can be used to help Yvette decide among each wheelchair system. You can also present this information to potential funding agencies to provide justification for a new wheelchair system.

A promising measure

Yvette's case provides a good example of the benefits of using the WhOM. Because it prioritizes the outcomes that wheelchair users wish to achieve with their wheelchairs, the WhOM helps to solicit client goals, facilitates outcome negotiation and streamlines wheelchair prescription. It enables objective comparisons to be made among different wheelchair systems in a way that avoids the problems associated with long-term recall. In an area of practice where measurement is difficult, it also provides quantitative data that is useful to (a) advocate for equipment, (b) make appeals to funding agencies or (c) evaluate wheelchair interventions. The WhOM measures the effects of equipment interventions and can be used to capture the effects of staff and client education or environmental modifications.

The WhOM is a novel outcome measure that (a) enables clients to identify and evalu-

Figure 2 Sample WhOM measurement, part two

2. Some people use their wheelchairs because they want to participate in activities outside of their home such as dog walking, or going for coffee, to work or to the park. What activities **outside of your home or in your community** would you use your wheelchair to perform?

Use this numerical scale to help fill in the table: 0 1 2 3 4 5 6 7 8 9 10					
Initial assessment Date:		Wheelchair system three Same power chair with tilt-in-space feature		Wheelchair system four Power chair with seat elevation and tilt	
Participation goals: e.g., walking the dog visiting my sister watching a hockey game	Importance How important is this activity to you? (0-10) 0 = Not at all important 10 = Extremely important	Satisfaction 1 How satisfied are you with your current level of performance of this activity? (0-10) 0 = Not satisfied at all 10 = Extremely satisfied	Importance x Satisfaction 1	Satisfaction 2 How satisfied are you with your current level of performance of this activity? (0-10) 0 = Not satisfied at all 10 = Extremely satisfied	Importance x Satisfaction 2
i. Banking	7	7	49	9	63
ii. Shopping	8	7	56	10	80
iii. Taking dog for walks	8	8	64	8	64
		Total of importance x satisfaction 1 scores = Score 3 169 Comfort = 9 Positioning = 9		Total of importance x satisfaction 2 scores = Score 4 207 Comfort = 9 Positioning = 9	
		Change in satisfaction = Score 3 169 - Score 1 46 = 123		Change in satisfaction = Score 4 207 - Score 1 46 = 161	

ate the outcomes they wish to achieve with their wheelchairs and wheelchair seating and that (b) allows clinicians to quantify the outcomes of their interventions in a helpful way for clients, family members, caregivers, health care administrators and potential funding bodies.

Free copies of the WhOM assessment and the WhOM manual can be obtained by contacting Dr. William C. Miller at bcmiller@telus.net.

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Linda's corner

Linda Norton, Rehabilitation Education Co-ordinator at Shoppers Home Health Care, answers your seating and mobility-related questions.

Q I have a client who needs a new cushion. With so many choices available, how do I help her choose the best one?

A The good news is there are many great products on the market. The bad news is there are many great products on the market! It can be overwhelming trying to stay up-to-date on the availability of products, which products are best for whom, and which product to try with a particular client.

The first step is to clarify the client's goals. Consider goals around pressure management, comfort, transfers, sitting tolerance, and so on. Understanding the client's goals will help you

determine what cushion to try.

The next step is to identify the properties or features you need in a cushion to meet these goals. For example, you may want gentle contours so the client will be able to easily move over them for transfers. You may identify that the client needs a low maintenance cushion, as she does not have consistent caregivers. Once you identify these properties, you can investigate which cushions best fit these properties. Start by asking your sales representatives which products meet the properties that you have defined.

The cushion that meets the set goals will likely be the most appropriate one for your client. With so many great products on the market, it is impossible to try every cushion out there with your client, but it is possible to choose the most appropriate one.



Linda

Contact Linda via phone **416-232-1706** or e-mail lnorton@shoppersdrugmart.ca

Custom contoured seating: Where do I start?

By Sheila Buck, BSc (OT), OT Reg (Ont), ATP

Determining if your client requires a custom contoured seating surface can be a challenge. For some clients, customized seating offers many benefits: it can minimize the risk of peak pressures and shear on weight-bearing surfaces, especially over bony prominences; it can provide the best postural support and control when modular seating does not match the client's shape; it can decrease the need for additional lateral and anterior supports; it is good for prolonged sitting where postural support and pressure relief is required; and it can prevent friction and shearing caused by downward migration—often seen with modular systems. (As a result, the client no longer needs to “hold on”; this frees their hands for functional activity.) In addition, custom seating is a one-piece construction, so there are less pieces to lose; accommodation, correction and aggressive support can be achieved where necessary; and due to close contouring, the client's body has more proprioceptive input, which may assist in decreasing agitated movements.

On the other hand, custom seating does have disadvantages; therefore, your assessment data may provide justification not to complete a full custom-contoured system. Disadvantages include the following: it may be limited for growth or shape changes; a fit that is too close may interfere with compensatory movements; proprioceptive input may be too great, creating reliance on the support surfaces; there may be

limitations for transfers depending on the shape; an increased potential for pressure points may result from improper positioning on highly contoured surfaces; and it can be labour intensive and therefore costly. As well, custom seating may have a limited trial time, resulting in an inability to set up the system for active mobility prior to finished production.

Assessing change

When assessing a client for custom seating, it is important to identify areas that may be affected by alterations in a client's seated position. This may include at-risk skin areas, tonal changes or contractures from long-term tonal changes, reflexes (normal and abnormal) and the client's use of reflexes in postural support, bony protrusions, respiratory and circulatory changes or changes in body position and orientation in space, the client's ability to sit unsupported, the client's ability to reposition themselves, incontinence, and swallowing, eating, and drooling problems.

Custom seating may begin at a basic level by adding a carved foam support to an already pre-fabricated back shell. This option is good for a client who requires minimal accommodation to back curvatures, as the overall shape of the back shell provides adequate support. Customizing an off-the-shelf cushion can also include adding additional adductor, abductor or obliquity pieces, or carving back one leg

trough for discrepancies. Again, these options are good for the client who is more actively mobile or who needs minimal adjustments in shape to match their contour or maximize their surface contact. If more aggressive accommodation is required, foam-in-place moulding may be needed. Again, a regular back shell may be used, but a closer contact to the

exact shape is achieved by pouring the foam around the client. However, foam-in-place is not recommended for aggressive correction, as it is difficult to maintain client alignment during the foaming process. Full custom-contoured shaping can be done through a variety of mediums, including a moulding frame, moulding bags, pin sensors or condensing a moulding substance. Each of these systems allows for full accommodation and correction where required.

Finding the best seating

When choosing between off-the-shelf or customized seating, reviewing the following areas will help you determine the best seating for your client:

Pressure: Does the client have a pressure-ulcer history, and on observation are there areas of redness or scarring? Does the client have asymmetry in weight-bearing surfaces? Are there bony deformities that protrude? Is there any rib/pelvic creasing, or a rib hump that contacts one side of the back surface first? Consider tightness at the back of the knee (tight hamstrings), high pressure at the back of the head from extensor tone, high pressure on the feet (toes, lateral edges, ankles) from high tone or lack of movement, or shearing pressure on the ears from head rotation. Consider pressure that may occur from custom contoured seating that may interfere with ostomy sites, G-tube sites, bowel and bladder catheters, shunts, or baclofen pump below skin surface. Considerations for nutrition/weight fluctuations from surgery, illness, or G-tube insertion and their contact on support surfaces will be important. Consider utilizing pressure mapping in order to fully discern pressure relief during contour and surface moulding.

Dysphagia: It is important to consider how positioning affects your client's ability to swallow and eat. Therefore, during simulation of the final position required, you must consider head and neck position as well as trunk elongation, abdominal pressure and alternate positions for feeding.

Prescribing custom seating

The following critical pathway will help you identify the steps to follow when prescribing custom seating. As a therapist, you must

- be aware of basic posture and seating principles
- understand ergonomic and biomechanical principles for mobility
- complete a mat assessment
- simulate posture and the support required to maintain that posture
- record wheelchair measurements after custom seating is complete to ensure fit into mobility base
- consider environmental factors and system functionality for the client and caregivers

Respiratory: A client's breathing capacity may be affected by changes in seated position; therefore, the degree of chest expansion and thoracic mobility must be assessed. If the client has a tracheotomy, the head and neck position must be maintained to ensure proper air flow. Often "straightening" the client may result in a tracheal shift, which causes an impingement due to spinal changes. In this case, pulse oximetry must be utilized to see changes in oxygen levels due to alterations in head and trunk positioning, and alternate activities.

Orthopedic changes: Past or future surgeries can change the client's ability to tolerate fixed positioning. Therefore, it is important to determine if the client has or will have tendon releases, osteotomies, spinal fusions, rod placements, or pin(s) or plate(s) insertion or removal. Fractures that resulted from osteoporosis or stress fractures can be determined by available bone scans, bone densities or X-rays. X-rays will also assist in demonstrating ongoing dislocations. Clients must also be assessed for possible arthritis and resulting pain that may occur from immobile joints.

Caregivers: When completing a custom seating system, transfers and use of mechanical lifts and slings can be difficult for caregivers due to the close contact of the curvatures. Prior to finishing a system, it is important to consider how the transfer is completed in order to ensure that the transfer will be able to be completed and that all slings can be removed after the client is in the chair. Custom seating can also impinge on catheter and condom drainage or urinal use if these factors are not considered or if seating is too contoured. In addition, dressing a client can be more difficult if done in the seating system as the client cannot be shifted as easily. Custom seating systems are generally a little more difficult to move and place in and out of a mobility base; therefore, the transport of the system must be addressed prior to determining the type of seating to be completed. Lastly, the ease of cleanliness and durability must be addressed as system integrity will be affected by the ability to maintain the general hygiene of the product.

Considering abnormal postures

When completing any seating, it is important to consider the prevention of abnormal pos-

tures, orthopaedic deformities and pressure problems. Therapists also need to address abnormal postures and functional orthopedic deformities that are flexible and that, when fixed, will enhance function and heal or correct the causes of pressure problems. Seating may also provide accommodation of abnormal postures and structural (fixed) orthopaedic deformities. Overall, seating should provide comfort and enhance or preserve functional ability and ease of management.

Custom contoured seating can be used to

address specific orthopedic conditions (see Table 1 below).

Clients come in different shapes and sizes, so their seating systems should accommodate each individual peculiarity. Although often seen as a daunting task, customized seating will provide your client with the best shape to increase surface contact where required for comfort, support and pressure relief.

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Applications of contoured seating for orthopedic conditions

Accommodate

Correct

Pelvic obliquity

- add to high side to maximize surface support
- add to lateral posterior edge under trochanter and bevel down under the IT

- slowly add to low side to shift balance to midline
- firmer support to increase shift

Posterior pelvic tilt

- open hip angle
- increased ischial well with pre-ischial support
- leg trough: avoid too aggressive abduction
- seat angle based on fixed/flexible trunk position
- maximum thigh support

- optimal ischial support
- maximize trough to decrease adduction
- surface materials—more friction
- optimal thigh support

Anterior pelvic tilt

- observe for pubic compression from abductor pommel
- leg trough: avoid too aggressive adduction positioning
- maximize thigh support
- set seat angle for trunk position

- surface material — higher friction
- optimal thigh support
- maximize leg trough to decrease abduction

Rotation

- lengthen forward side of base to support thigh
- observe and lengthen ischial shelf/well on forward side or reduce on opposite side
- accommodate leg trough for windswept position

- maximize abductor/adductor trough to maintain leg alignment
- optimize seat depth/height for function

Kyphosis

- open seat/back angle for sacral support and relief for kyphotic area
- provide tilt in seat/frame and open angle of back to change orientation for visual field

- provide sacral support and open for back extension above pelvic crest
- avoid high backs with full lateral curvatures promoting shoulder protraction

Scoliosis

- support curvature to maximize pressure relief
- support to gain head in midline where possible

- three-point positioning, forces at apex of spine (not rib cage) and on opposite side high/low
- monitor ability to position in chair—interference of laterals on transfers/clothing changes

Rotoscoliosis

- Contour around rib hump supporting at lateral apex
- monitor iliac crest on rib cage
- observe for breathing
- avoid "lifting" as trunk will collapse back and increase pressure

Setting new criteria: The Wheelchair Seating Posture Measurement Standard

By Barbara Crane, PhD, PT, ATP, and Douglas Hobson, PhD

In the field of wheelchair seating, tremendous variation has existed in both the terminology and the term definitions needed for the communication of critical postural information and support surface parameters in a way that is uniformly useful to service providers, technicians, researchers, manufacturers, wheelchair users and purchasers of wheelchair seating devices. To address this need, a group of international wheelchair seating experts began work in 1998 within the structure of the International Organization for Standardization (ISO) to develop a series of wheelchair seating standards. Part 1 of the ISO 16840 series called "Vocabulary, reference axis convention and measures for body segments, posture and postural support surfaces," recently was published as an international standard (ISO 16840-1:2006). Sample measures defined in this standard are illustrated in Table 1.

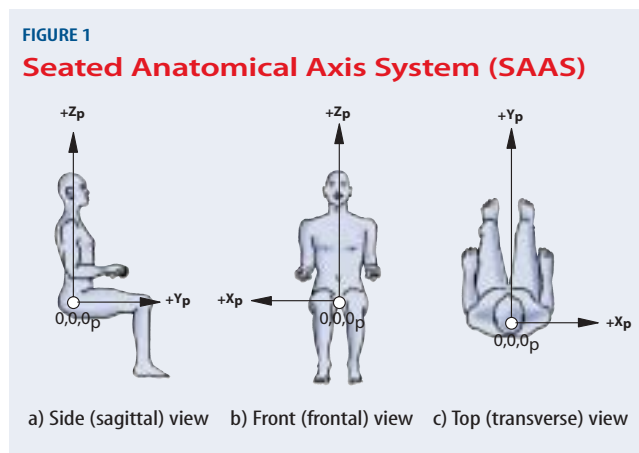
The purpose of 16840-1 is to specify standardized terms and definitions for the quantification of both person (i.e., anthropometric measures and seated posture) and machine (i.e., spatial orientation and dimensions of a person's seating support surfaces). By design, this document provides support for scientific research and for clinical practice in all areas of the service delivery process. Work has begun on development of the tools necessary to enable clinicians to utilize the measures in the Part 1 standard. This work will continue with refinement based on feedback from audiences. Successful implementation should allow clinicians to improve their clinical practice in the area of wheelchair seating.

Foundational concepts

The following concepts are elements of the integrated measurement system that, when used together with the proposed terminology, permit the objective description and recording of both the person's seated posture and the dimensions of their postural support system.

Global Coordinate System: In order to take measures that will have consistency across facilities and over time, a standard coordinate

system of measures are considered—side, front and top—thereby allowing an approximate 3-D representation of posture. Note that values for linear location measures can be positive or negative depending on the direction they extend from the 0,0,0_p centre. Separately and/or collectively, this coordinate system allows for measurement in the three traditional orthogonal planes of locations, angles and linear dimensions of a seated person's body and their seating support surfaces.



system must be used. This is called the Global Coordinate System in the standard. Figure 1 illustrates the direction of the positive X, Y, and Z axes relative to the seated person. The Global Coordinate System remains fixed in orientation and thereby serves as the constant reference to which all linear and angular measures can be made—for the person, their support surfaces, and their wheelchair (only the person is shown in Figure 1).

As seen in Figure 1, there are three views in

Integrated Measurement System: Three coordinate axis systems are in the Global Coordinate System: one for the person (seated anatomical axis system or SAAS), one for their postural support devices (support surface axis system or SSAS, see Figure 2), and one for the wheelchair (wheelchair reference system or WRS). Though described separately, each is designed to allow integration with the other two systems. Such integrated measurement can thereby provide for a description of the seated posture of the person, the dimensions and placement of their postural support system, and the desired configuration of the wheelchair.

Absolute and Relative Angular Measures: The recording of angular measures of body segments in all three planes gives us an objective method for describing and documenting seated posture. This standard defines two types of angular measures, absolute and relative, because it is clinically important to be able to define the orientation of body segments both with respect to other body segments (as this reflects joint position) and to a fixed outside reference (as this reflects orientation in space). *Absolute angles* define the orientation of a single body segment or support surface relative to the vertical or a horizontal axis, and *relative angles* define the

TABLE 1
Sample measures defined in the standard

Body measures			Support surface measures			
Absolute angles	Relative angles	Linear measures	Absolute angles	Relative angles	Linear size	Linear locations
Sagittal thigh	Sagittal thigh to trunk	Thigh depth	Sagittal seat	Seat support to back support	Seat support depth	Lateral trunk support frontal
Sagittal pelvic	Sagittal pelvis to thigh	Scapula height	Frontal head support	Seat support to leg support	Foot support width	Back support sagittal

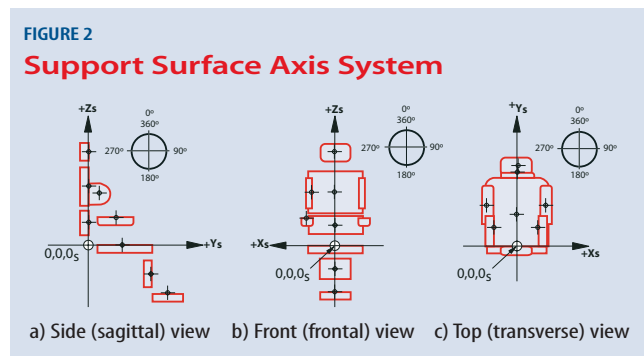
angle between two adjacent body segments or support surfaces.

Body Segments, Anatomical Landmarks and Segment Lines: In order to define absolute and relative angles of the body, it was first necessary to identify the specific body segments of interest. To accomplish this, body surface landmarks and lines joining these landmarks (termed segment lines) were defined for those body segments critical for

very few “scientific” ways of quantifying what we do and why it is important to those we serve; however, we are being challenged more to demonstrate evidence-based need for both our services and for the specific devices we recommend. It is our belief that the application of this seating standard will elevate the level of clinical practice in our field and will assist in documenting and communicating positive seating outcomes, thereby helping to validate the need for our specialty services and the equipment we recommend.

Manual tools that currently exist include items such as full circle goniometers, standard plumb lines, inclinometers, specialty tools such as the PALM Meter, and wheelchair seating simulators. Existing tools are readily accessible and

remotely via a secure Internet-based interface. The science of digital image processing has reached a stage that may allow clinicians to quickly obtain one or more digital images of a person seated in his or her wheelchair, upload these images to a computer, and receive a report indicating all desired body angles that will help guide the clinical decision-making process. This tool would involve seating clinicians in performing the following steps: (1) apply body segment markers, (2) establish desired posture—possibly using simulator, (3) take digital images and upload them to a computer, (4) identify angular and linear measures of interest for both body and support surfaces, (5) prescribe/design support surfaces, (6) establish integration with wheelchair, and (7) record and communicate results. Advantages of an automated system include increased reliability and validity of postural measures, saving clinician time during the assessment process while providing more valuable information, allowing clinicians to compare client posture before and after interventions, and allowing clinicians to monitor postural measures over time. Possible disadvantages of this system over time include limited availability of a system, additional costs to often over-extended service delivery programs, the system requires use of a computer and digital camera, it relies heavily on the ability of a clinician to locate and mark body landmarks—the reliability of which is unknown, and this process may initially be cumbersome to integrate into clinical settings.



defining seated posture, in each of the three views. The centre of rotation (usually joint centres) for each segment line is also defined. Measurements of deviations of body segment lines from the designated reference axis in the compass rose, projected to the three orthogonal planes, permit the measurement and recording of body segment angles.

Support Surface Geometric Center and Reference Lines: Because support surfaces are not universal, the concept of the support surface geometric center (SSGC) was developed. The SSGC exists at the centre of the support surface. This hypothetical point on any support surface has a consistent definition regardless of the size, shape, or configuration of the particular support surface involved. From this location, a support surface reference line is described which extends out of the support surface geometric centre and which is then used to determine absolute and relative angular positions of the support surface. As with body segments, these reference lines are defined within each of the three planes. The SSGC is used not only as the standardized centre of rotation for angular measures of support surfaces but also for the standardized point to which linear location measures of support surfaces are taken.

Application of the standard

Currently, wheelchair seating clinicians have

may even be present in current clinics. While many of these tools are low cost and simple to use, primary disadvantages include the high time demand required to use these tools and limited or unknown inter- and intra-rater reliability. Additionally, some of these tools, such as the traditional seating simulators, are relatively expensive and not widely available among seating clinicians.

Future directions

One of the primary impediments to full implementation of this complex standard will be a lack of automated tools that will allow clinicians in many different settings to quickly and easily obtain the appropriate postural measures and incorporate these findings into their clinical decision-making and equipment justification process. Tools will be necessary that allow maximum reliability, validity, and efficiency in this posture quantification process. In light of the previously mentioned disadvantages of currently existing manually applied tools, there is a need for development of new, particularly automated, tools. It may be optimal to provide seating clinicians with a “tool kit” that includes simple, reliable manual tools and access to automated tools that can be reliably applied in many types of settings and that are low cost options for seating clinicians. These tools would be founded on widely available digital photography and standard computer systems and may be accessible

Efficient application

Tremendous effort has gone into the development of a posture measures standard that can be applied to wheelchair seated persons. Now that this international work has been published, work continues on the adoption of national standards, development of supporting materials (including a clinical applications guide) and development of potential tools that will facilitate implementation of these measures into common clinical practice. We propose development of an automated tool that will allow maximally effective and efficient application of this standard.

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Conductive education: A growing approach to rehabilitation

By Eleonorá Tamasne, BA (Hons), QCS, QTS, and Lauri Morris, BA (Hons), QCS

The term “conductive education” is being heard more frequently in Canadian rehab. Although the term has been known and used by professionals, parents and clients from around the world, the implications of this term have caused some confusion in this country as it is, compared to other forms of rehabilitation, a relatively new term.

A brief history

To learn about conductive education, we must explore its roots. Professor András Pető was a Hungarian educator and doctor who established conductive pedagogy following World War II. He worked in the fields of neurology, psychiatry, tuberculosis, psychotherapy, and biochemistry in Austria before his return to Hungary in 1938. A few years later, he was invited to teach “movement therapy” at the College of Special Education.

He started his work in two empty rooms with 13 so-called “uneducable” children and four medical students as helpers. Two years later, a group of paediatricians examined the results of Dr. Pető’s work and found the outcome very positive. Many of the children had become independent and were able to attend normal schools.

Following the success of Dr. Pető’s work, conductive pedagogy was eventually adopted as an educational system. Pető was ahead of his time in the areas of integration and normalization, and he led the way for a humanist-based approach to rehabilitation. He opened a period in which placing people in society, rather than segregating them, was considered a cornerstone of care. He was the first to regard people with motor disabilities as an educational-pedagogical problem. Until then, disability had been perceived primarily as a biological matter.

An educational-rehab hybrid

Conductive education is a form of special education and rehabilitation for people with neurologically-based motor disorders. It is a psycho-pedagogic intervention, operating upon learners at the psychological level: upon their emotions, motivations, awareness, prob-

lem-solving skills, and their mind and personalities. It requires clients to actively participate in overcoming their challenges.

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Orthofunction is characterized by an individual’s general capacity for adaptation or learning, which enables him to adjust to his biological and social environment; lifelong development is dependent on this capacity for learning. Conductive education teaches individuals how to become orthofunctional.

Every learning process starts from needs, that is, motivation. These needs may be originated from the organism itself or from the environment when they are called requirements. The latter, if related to the satisfaction of an inherited need, leads to the organization of the activities via the learning process. In his or her activities, the individual will accommodate himself to the requirements and the satisfaction of his needs, which include meeting the requirements. However, the requirements will become needs, and the performances will transform into abilities.

Conductive education does not concentrate merely on the client’s physical state because it regards the client as a complete person, where intelligence, speech, emotions, movements and so on are all integrated into one inter-related system. By facilitating the learning process there is development of the whole person rather than a focus on the presented handicaps.

A sense of responsibility

The conductive program must foster in the client a sense of personal responsibility and commitment. Conductive education teachers (conductors) work in a group setting where individual needs are met and everyone can see and share in the achievements of the other

participants. Through multilateral activities, the integrated and highly structured program ensures a client’s overall development.

Conductive education is beneficial for people with cerebral palsy, stroke, multiple sclerosis, Parkinson’s disease, dystonia, dyspraxia, acquired head injuries and other movement disorders of neurological origin. Clients can be expected to improve in the following areas:

- increased confidence in abilities and level of independence
- improved bodily control, mobility and quality of life
- strategies for learning to move without inducing spasm or spasticity
- increased knowledge of the neurological implications of a client’s condition
- improved ability to perform movements
- techniques to enable the family to ensure maximum potential

A growing phenomenon

Since the late 1980s, conductive education has begun to spread worldwide. Parents in the U.K. first became interested with the airing of a short documentary titled “Standing up for Joe” in 1988. In the years following, as demand for conductors and conductive education grew, numerous centres and schools began to offer conductive education throughout Britain, Europe, Australia, New Zealand, the United States, and Canada.

In order to provide conductive education, conductors require a B.A. (Hons) degree from a recognized university. Training is currently available at the International Pető Institute in Budapest, Hungary, the University of Wolverhampton in Birmingham, England, and Aquinas College in Michigan, United States. With this increase in graduates and the geographic spreading of teachers, conductive education is now available at some level in just about every country in the world.

Elenorá Tamasne, BA (Hons), QCS, QTS, is a senior conductor with over 13 years of experience. Lauri Morris, BA (Hons), QCS, is a conductor with the Ontario March of Dimes in Toronto, ON.

No more accidents *continued from page 1*

Even more serious than the financial cost is the life-changing aftermath of injuries, particularly falls in older adults. Any injury that results in being unable to meet one's activities of daily living results in a serious loss of independence quickly followed by potential loss of self-esteem, self-efficacy and quality of life. Indeed, the injury that doesn't happen can be the greatest gift we can give our clients.

The role of language

When it comes to injury prevention, language is a very powerful tool. A change in language can be a first step towards a change in attitude. In the case of injuries, the word "accident" is frequently misleading and not as accurate as other words. Some of the words found in a dictionary or thesaurus that define the word "accident" are chance, fortuity, hap, luck, fluke, fortune, casualty, misfortune, mishap, destiny and fate. These words imply that we have little sense of control. Words like "misfortune" and "casualty" may make it appropriate to use the word "accident" when describing an injurious event but the vast majority of circumstances are far more accurately described by other words such as injury, collision, incident or crash. Other descriptive words include unintentional, inadvertent, tragedy or loss.

The awareness campaign "No More Accidents! Call it what it is . . . Injury, Collision, Incident or Crash," was developed by staff at the Grey Bruce Health Unit in 2003 and has spread across Ontario through other public health units, hospitals and injury prevention coalitions. The campaign is not about teaching professionals to say that accidents never happen; rather, it is about educating professionals to more accurately describe injuries in hopes of increasing awareness and efforts for prevention.

Preventing injury

When discussing injury prevention, a question to determine whether or not the injury was predictable and preventable is to ask the client if he or she would do something differently if he or she had a chance to relive that moment. Whether it was to pay more attention or to remove a hazard or to decrease one of the many other risk factors associated with injury, most injured people can come up with something that they, or another person, could have done differently. Even with circumstances such as having an unexpected dizzy spell, being fit and

learning how to fall can decrease the risk of injury as can areas free of clutter and removal of furniture with glass or sharp edges. (On the other hand, some clients believed that they were victims of circumstance and that nothing could have been done. It is not the intent of the No More Accidents campaign to contradict or argue the point but to reframe the experience.)

Patricia O'Neil, a certified kinesiologist, has been working with injured clients for over 20 years. O'Neil states that when clients refer to an injury as an accident, she will agree that it was an unfortunate incident, and then focus her efforts on the circumstances of what happened and what could be done to prevent future injuries.

O'Neil, a member of the Grey Bruce Community Coalition for Prevention of Falls in Older Adults, is a strong advocate for injury prevention through education and skill building. "If we can get clients to have improved leg strength, flexibility and balance, they are far less apt to fall. We teach exercise skills and focus on what we can do rather than just talking about how unfortunate it was that an injury occurred." To educate her clients, O'Neil distributes injury prevention resources such as the "Are You in Jeopardy?" home safety assessment.

O'Neil says she believes in the No More Accidents philosophy because many falls can be prevented. Many times clients explain that they "just fell." Yet further questioning leads them to reveal that they were on their way to the bathroom during the night but didn't bother to take their cane or they had just walked into the supermarket from the bright sunlight and didn't see the edge of the store display. Once the incident has been properly identified, individuals are quick to realize how they might have prevented the fall and the subsequent injury. Encouraging a preventative attitude among seniors through education will help them be more aware of their surroundings, their physical limitations and responses needed to help avoid a life-changing fall.

When educating a client about injury prevention, respect for the client's beliefs is always paramount, but Patricia O'Neil suggests that

therapists take each teachable moment to help clients understand the non-accidental nature of most injuries.

Reducing the risk

The cornerstone of the No More Accidents campaign is that we actively preplan safety rather than just accepting injuries as an inevitable part of life. Smartrisk has developed five tenets to guide our actions: (1) buckle up, (2) look first, (3) wear the gear, (4) get trained and (5) drive sober. The overall message is to live life to the fullest and to take risks but to take them in a safer way. Each message helps us to manage the risk.

"Buckle up" includes wearing seatbelts and ensuring that children are in appropriate car seats. "Look first" illustrates the importance of checking out the water before diving or the terrain before going mountain biking. For seniors, this could mean concentrating upon the walkways to ensure there are no hazards. "Wear the gear" reminds everyone to wear bicycle helmets, including adults. Similarly, supportive footwear and workplace safety glasses help to reduce risk. "Get trained" refers to taking instructions in sports and in workplace safety. It also refers to older adults taking exercise classes. Finally, "drive sober" obviously means to drive without consuming alcohol or other drugs. It also means not driving while fatigued or after medical or dental procedures that make you feel less alert. Driving sober means giving your transportation your full attention.

Injuries can be reduced. Accepting the predictability and preventability of injuries by not calling them accidents is a first step. The No More Accidents campaign is a small but important part of the comprehensive work to decrease injuries.

Injury prevention information is available at local public health units and at www.smartrisk.ca

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Resources for professionals

A CD containing support material for the "No More Accidents!" campaign is available free of charge to health care professionals. The CD includes a media advisory, PowerPoint presentation, news releases, letters, and more to help interested professionals spread the word about client safety in their community. To order your copy, e-mail thomasm@publichealthgreybruce.on.ca.

Arthritis prevention and care: New standards for Canadians

By the Alliance for the Canadian Arthritis Program

A lack of awareness of arthritis exists among the public, government, employers, educators, health care providers and people at risk for and affected by arthritis. Indeed, arthritis is frequently perceived as a normal part of aging. This is particularly true for osteoarthritis. Although musculoskeletal (MSK) conditions represent up to one-fifth of all visits to primary care practitioners, there is a lack of confidence (including a lack of knowledge and skills) among primary care physicians in performing an arthritis screening assessment. This results in under-diagnosis and under-management of arthritis in the community.

Musculoskeletal conditions also comprise the largest practice area for physical therapists and occupational therapists. Despite this, MSK conditions are under-recognized in the professional certification examinations. There are no minimum level practice standards or core curricula specific to arthritis/MSK in Canadian occupational therapy and physical therapy training programs and content varies across universities.

Delivering accurate information and high-quality educational programs is important to aid in the goals of changing attitudes and health behaviours. These programs need to target multiple groups: the general population, government policy makers, health care providers, people with arthritis, and their families, caregivers, teachers, etc. Strategies are also needed to ensure core competencies among health professionals about arthritis.

Living with arthritis

Arthritis affects participation in broad roles and societal activities such as employment, education, social involvement, personal relationships, and leisure activities. These roles are part of people's identity, current and future goals, and aspirations such that participation, or lack thereof, impacts on life satisfaction and quality of life. Restrictions in participation are associated with emotional distress that may persist over time. Participation needs and goals will change across the lifespan. Assessment and intervention should therefore reflect these lifespan-related shifts, from childhood through

adulthood and into the retirement years. A broad range of personal and contextual factors will also influence participation.

The current model of care delivery to people with arthritis is inadequate to meet current and future (growing) population needs.

In spite of its importance, participation is under-evaluated as an important outcome to measure in clinical practice and clinical research, and by employers, educators and policy makers. The impact of difficulties in participation is under-evaluated. The impact of interventions designed to improve participation has been under-studied. Facilitating change will require the wide-ranging input and cooperation of many groups, including people with arthritis themselves, their clinicians, family, employers and policy makers.

The current model of care delivery to people with arthritis is inadequate to meet the current and future (growing) population needs. There are not enough arthritis health professionals. (rheumatologists, orthopaedic surgeons, anaesthetists, nurses, occupational and physical therapists, primary care physicians, etc.). Furthermore, available arthritis health professionals are not being used efficiently (e.g. orthopaedic surgeons spend only one third of their clinical practice in the operating room). As a result, waiting times for consultation for conditions requiring specialist care (e.g. new onset inflammatory arthritis and orthopaedic surgery) are unacceptably long, resulting in suboptimal clinical outcomes, increased costs to the health care system and society, and reduced quality of life for people with arthritis. There is inadequate monitoring of wait times for essential arthritis services in Canada.

Guidelines exist for the diagnosis and management of osteoarthritis (*American College of Rheumatology Subcommittee on Osteoarthritis Guidelines, 2000*) and osteoporosis, yet these guidelines are not being

followed. Furthermore, self-management approaches have been used successfully in arthritis, but are currently underutilized.

Developing the guidelines

Based on these and other challenges that people with arthritis face, The Alliance for the Canadian Arthritis Program (ACAP) brought together arthritis health care professionals, researchers, funding agencies, government, voluntary sector agencies, industry, and most importantly, representatives from arthritis consumer organizations from across Canada to consider what could be done to improve the lives of Canadians with arthritis.

ACAP recognized that if arthritis was to be prevented and the health of Canadians with arthritis improved, one of the most pressing needs was the establishment of standards for arthritis prevention and care. With this goal in mind, ACAP developed a Summit Planning Committee who brought together representatives from across the broad arthritis community. To begin their work, the Planning Committee sought out and identified key issues facing Canadians with arthritis and their caregivers. These issues were then grouped into three themes: arthritis awareness, arthritis prevention and arthritis management. Once the three key themes were identified, distinct areas for standards were outlined, and teams were formed to begin work on each area. The teams met frequently and developed draft standards, which were shared with the broader arthritis community. A final draft version of the care standards was presented at the Summit on Standards for Arthritis Prevention and Care in November 2005. The 15 Standards for Arthritis Prevention and Care, each followed by a list of action steps to encourage implementation, are as follows:

1. Every Canadian must be aware of arthritis.

- Take an inventory of existing public information sources on arthritis.
- Develop a contact list of arthritis community members and a systematic approach to disseminate information to all members.

- Develop partnerships with government and non–arthritis groups.
- Capacity–build within the health professionals’ community to ensure demand from raised public awareness can be met.
- Using a multi–media approach, create and launch a public awareness campaign with a few key messages targeting all age groups, cultures, and geographic regions.

2. Every Canadian with arthritis must have access to accurate information and education on arthritis that meet a defined set of criteria and are appropriate to their age and stage of disease.

- Establish a working group to facilitate the development of “quality standards” against which all arthritis information and educational materials can be judged.
- Ensure input from all stakeholder groups, both nationally and internationally, in developing the “quality standards” to encourage international buy–in and use.
- Establish a plan to build capacity for stakeholder review of publicly available arthritis information, which may include development of a national strategy for the delivery of accurate information about arthritis to the public at large, and high–quality educational programs to people with arthritis.

3. Participation in social, leisure, education, and community and work activities must be an integral measure used to evaluate outcomes by health professionals, educators, policy makers and researchers.

- Governments must invest urgently in continued development and testing of measures to evaluate participation across all ages and types of arthritis.

- Incorporate evaluation of participation in clinical assessment of people with arthritis (across all age groups and types of arthritis).

4. Every Canadian must be informed about the importance of achieving and maintaining a healthy body weight, and actively encouraged to engage in physical activity, to prevent the onset and worsening of arthritis.

- Need for standardized quality, accessible, adaptable community–based programs/facilities.
- Incorporation into a public awareness campaign—the strong message that physical activity and healthy weights are beneficial for arthritis (may prevent arthritis and reduce symptoms once arthritis is established).
- Incorporate arthritis into the Public Health Agency’s (Health Canada) Physical Activity agenda.

5. All relevant health professionals must be able to perform a valid, standardized, age–appropriate musculoskeletal screening assessment.

- Validate a screening tool appropriate for use in clinical practice.
- Develop a plan to teach/disseminate.
- Test students for acquisition/retention.
- Review patient outcomes.
- Develop core group of educators to implement above steps.

6. Inflammatory arthritis must be identified and treated appropriately within four weeks of seeing a health care professional.

- Develop, test, and then implement a clinical tool, intended for use in primary care practice and by other relevant health care profession–

als, to assist in the recognition of inflammatory arthritis

- Incorporate this arthritis screening “tool” into the training of all relevant health care professionals.
- Establish maximum acceptable wait times for time–from–referral to consultation with rehabilitation health professionals for various arthritic conditions.
- Increase continuing medical education and health–professional–directed knowledge–translation activities regarding the diagnosis and management of inflammatory arthritis.
- Develop incentives (and remove disincentives) for health care professionals to attend arthritis continuing–medical–education activities.
- Increase awareness of arthritis among the public (increase attention paid to new symptoms, demand diagnosis and treatment) and all primary care providers.
- Develop guidelines appropriate for the context of primary care.
- Empower people with arthritis to seek and demand care.

7. Health care professionals must recognize osteoarthritis as a significant health issue and treat it according to current guidelines.

- Ensure valid and reliable screening tool for arthritis incorporates identification of people with possible osteoarthritis.
- Develop incentives (and remove disincentives) for health care professionals to attend arthritis continuing–medical–education activities.
- Modify existing guidelines for osteoarthritis care such that they are appropriate for use in the primary care setting.

continued on page 12

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8. Bone mineral density testing must be offered free to all women older than 65 years, all men and women with low trauma fracture after age 40, and every Canadian of any age with risk factors for osteoporosis, according to current prevention and treatment guidelines.

- Disseminate “tool kits” to support evidence-based diagnosis and management of osteoporosis for primary care professionals.
- Develop incentives (and remove disincentives) for health care professionals to attend arthritis continuing-medical-education activities.

9. Every Canadian with arthritis must have timely and equal access to appropriate medications.

- Determine which arthritis medications can be considered “life-saving” or “quality-of-life-saving.”
- Determine current access to available effective therapies for arthritis.
- Develop a proposal for the development of a national drug program to ensure rapid and equal access to life-saving and quality-of-life saving medications.
- Pilot-test a limited expanded access program.

10. Post-approval evaluation of arthritis medications must be part of a drug approval.

- The federal government must mandate post-marketing surveillance to provide real-world safety and effectiveness information on all drugs.

11. Patient preferences, including risk-benefit trade-offs, must be incorporated into regulatory decision-making and prescribing of arthritis medications.

- Arthritis consumer organizations demand inclusion in all health policy decision-making processes regarding medication review.

12. Every Canadian with arthritis requiring

joint surgery must wait no longer than six months from the time the decision to have surgery is made by the patient and physician.

- Support research to identify, test and implement more efficient, integrated, alternative models for arthritis care that take into consideration the shortage of arthritis health professionals.
- Develop and disseminate appropriateness criteria for total joint replacement (and for other orthopaedic surgeries) for primary care providers, rheumatologists, and people with arthritis.
- Promote “active” waiting rather than current passive waiting (i.e., pre-surgery education, rehabilitation, etc.) during the waiting period.
- Identify strategies to expand training, recruitment and retention of orthopaedic surgeons.

13. To prevent arthritis, every Canadian must understand and implement prevention strategies to reduce sport and recreation injuries.

- Governments must invest urgently in research to evaluate risk factors for sport and recreation injury, with subsequent development and testing of interventions designed to ameliorate identified risk factors.

14. Every Canadian with arthritis must have timely access to appropriate integrated health care, appropriate to their age and disease stage.

- Governments must invest urgently in designing and testing new models of integrated health care that take into consideration limited existing and future health professional resources.

15. Every Canadian with arthritis will be enabled to participate in life roles that are important to them.

- Public awareness and health professional education.

Implementing the standards

Earlier this year, ACAP’s Steering Committee determined the next steps for standard implementation. Each standard was discussed with respect to its importance to people living with arthritis and the feasibility of implementing the standard in Canada to make a discernible difference to their lives within one to two years. Consideration was also given to the ongoing activities of each of the stakeholder arthritis organizations and what was unlikely to happen without the collective energy of the arthritis community behind it.

Based on these discussions, standards 1, 5, and 9 were identified as requiring immediate attention. The initial focus of attention for ACAP will be on these three standards. Once these standards have been implemented, ACAP will focus on each of the remaining standards in turn, according to feasibility and relevance.

The areas that have been identified as requiring additional research have been provided to the relevant arthritis funding bodies (The Canadian Arthritis Network, the Institute for Musculoskeletal Health and Arthritis within the Canadian Institutes of Health Research, and The Arthritis Society). Priority setting within the many identified research questions was also established.

There was general consensus among the arthritis stakeholder groups that the priority for research is to develop and test alternate models for arthritis care. Only through innovative new models can we ultimately achieve many of the identified benchmarks for arthritis care in Canada.

This article has been adapted from the Report from the Summit on Standards for Arthritis Prevention and Care, produced by the Alliance for Canadian Arthritis Program. For the full report, visit www.arthritisalliance.ca.

The Alliance for the Canadian Arthritis Program brings together over 30 arthritis stakeholder organizations to support individuals living with arthritis.

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