Scoliosis

From the February 2015 Ottawa Public Health Physicians' Update:

"Early diagnosis of scoliosis in a healthy active child will make all the difference."

It takes just 30 seconds to test for this condition.

What is it?

Scoliosis is an abnormal curvature of the spine. It is a three-dimensional deformity, where the spine curves in the shape of an S or C, twisting and rotating the ribcage and torso. The condition is usually pain-free but progresses fast undetected. The cause of most scoliosis is still unknown ("idiopathic"), although 30% of cases are believed to be genetic.

Who is affected?

Scoliosis affects 2-4% of teenagers, with seven times more girls than boys needing treatment. Almost every classroom in the country may contain a teen who is unaware they have scoliosis. About one in 10 of those diagnosed with the condition will require treatment. Close monitoring of young patients is crucial, as scoliosis curves worsen quickly during growth spurts. The risk of progression depends on gender, remaining growth potential, and bone maturity.

Adults can also suffer from scoliosis, either diagnosed at a young age or developed later in life. As people age, scoliosis can be challenging to treat in conjunction with arthritis and other conditions. Adult scoliosis affects 30% of the population, with the rate among older adults close to 60%.

How is it diagnosed with minimal expense?

The simple, 30-second Adam's Forward Bending Test allows quick clinical detection of scoliosis. A scoliometer reading showing a curve of 5-7 degrees or more should be confirmed by X-ray. An iPhone app called Scoliogauge has also been validated for use in screening.

What are the treatment options?

Most cases of scoliosis can be prevented from worsening if detected early. Treatment options include scoliosis-specific physiotherapy, full- or part-time bracing, and spinal fusion surgery. Orthopedic surgeons generally recommend surgery when a scoliosis curve measures 50 degrees or more. These 8- to 10-hour operations permanently fuse the spine to reduce the degree of curvature.

However, many of these major surgeries can be avoided with early detection of scoliosis. Bracing has been shown to stop the progression of curves in 73% of cases. In Europe, where treatment combines scoliosis-specific physiotherapy and bracing, surgery is avoided in up to 92% of cases.

Why does it often go undetected in Canada?

Routine school screening for scoliosis was abandoned in Canada 35 years ago. Family doctors are not mandated to screen, and public awareness of scoliosis is low. Since school screening stopped in the early 1980s, the trend has been toward late diagnosis, more surgeries, and fewer brace prescriptions. In Canada, up to 32% of teens with Adolescent Idiopathic Scoliosis are diagnosed late, meaning the window of opportunity for treatment with scoliosis-specific physiotherapy and bracing is missed.

Who is raising awareness?

Scoliosis surgery numbers at CHEO are rising. However, awareness of scoliosis in the Ottawa region is also higher than before, thanks to the many volunteers, professionals, and organizations playing a role in this effort:

- **Dr. Isra Levy**, Ottawa's Medical Officer of Health, included scoliosis screening information in Ottawa Public Health's February 2015 newsletter to physicians, encouraging them to screen for the condition.
- **Andrea Lebel PT**, experienced scoliosis-specific physiotherapist (and scoliosis sufferer), has presented extensively on screening and non-surgical treatment of scoliosis, at conferences, hospitals, and community health centres in Canada, the U.S., and Europe.
- **CHEO President and CEO Alex Munter and CHEO staff**, through holding patient information nights and Telehealth Rounds for physicians on pediatric scoliosis (2012, 2015); and promoting events on social media.
- **Dr. Kellie Leitch MP** spoke in the House of Commons in 2013 about the need for greater public awareness of scoliosis.
- **Jim Watson, Mayor of Ottawa**, proclaimed June 1 Scoliosis Awareness Day in Ottawa.
- **Rogers TV, CTV, The Ottawa Citizen**, and community newspapers have covered the issue.
- **Scott Hannant / Hannant Media Solutions** produced educational video in English and French.
- **Curvy Girls Scoliosis Support Group of Ottawa,** launched in September 2011. The dedicated leaders, members, parents, and volunteers of Curvy Girls Ottawa are pursuing the public education and fundraising goals described below.

Public education: Bring back school screening for scoliosis

Children in Canada are no longer routinely checked for scoliosis. Teens may not have annual physicals and, even if they do, doctors are not necessarily checking their backs. Many parents are unaware of scoliosis and its signs. International organizations, including the WHO, recommend scoliosis screening for early detection and treatment. In the U.S., schools in 18 states still screen, and the U.S. Preventive Services Task Force is taking the first steps to bring screening back nationwide.

Curvy Girls Ottawa has prepared a leaflet describing the simple Adam's Forward Bending Test, and visits schools to raise awareness. The group has also produced a scoliosis awareness video for teens and their parents, to be shown in schools, posted on school websites, and shared on social media.

Fundraising to support:

- Increased outreach to families, schools and school boards, and the media
- School education programs: videos, posters, handouts, and other educational material
- Development of a travelling exhibit for schools
- Creation by an artist of movable, life-size sculptures showing how scoliosis affects the body in three dimensions, to provide children and parents with a unique hands-on learning experience
- Promotion of Scoliosis Awareness Day in Ottawa
- Campaign for a Scoliosis Awareness Day in Ontario
- Lobbying for a National Scoliosis Awareness Day
- Alternatives to X-rays, such as MRI or EOS imaging, to reduce radiation exposure during diagnosis, allow more frequent monitoring of scoliosis patients, and reduce cancer risk.

Further information and references

School screening in Canada: Bring it back

A 1985 article based on a 1977-78 Quebec study concluded that "school screening for idiopathic scoliosis is not justified." This study influenced the decision to discontinue school screening in Canada.

Morais T, Bernier M, Turcotte F 1985 Age- and sex-specific prevalence of scoliosis and the value of school screening programs. American Journal of Public Health, 75(12): 1377-1380

Beauséjour M, Goulet L, Parent S, Feldman DE, Turgeon I, Roy-Beaudry M, Sosa JF, Labelle H, Members of the Quebec Scoliosis Society and of the Canadian Paediatric Spinal Deformities Study Group: The effectiveness of scoliosis screening programs: methods for systematic review and expert panel recommendations formulation.

Adam's Forward Bending Test:

Côté, Pierre, Brad G. Kreitz, J. David Cassidy, Anne K. Dzus, and Johanne Martel. "A Study of the Diagnostic Accuracy and Reliability of the Scoliometer and Adam's Forward Bend Test." Spine: 796-802. Print.

The pendulum swings back to scoliosis screening: screening policies for early detection and treatment of idiopathic scoliosis - current concepts and recommendations
Theodoros B Grivas[1*], Michael Timothy Hresko[2], Hubert Labelle[3], Nigel Price[4], Tomasz Kotwicki[5] and Toru Maruyama[6] http://www.scoliosisjournal.com/content/8/1/16

Lack of school screening in Norway has led to increased numbers of teens undergoing surgery.

Scoliosis detection, patient characteristics, referral patterns and treatment in the absence of a screening program in Norway
Raphael Dziwornu Adobor[1], Rolf Bjarne Riise[1], Roger Sørensen[1], Thomas Johan Kibsgård[1], Harald Steen[2] and Jens Ivar Brox[1] http://www.scoliosisjournal.com/content/7/1/18*

Reducing radiation exposure: MRI or EOS imaging

Full-length, standing X-rays of the spine are the standard method of confirming a scoliosis diagnosis and monitoring curve progression every 4-6 months. However, exposure to harmful radiation could be avoided through use of MRIs, following the model developed at Comer Children's Hospital in Chicago. Another alternative is EOS technology, which greatly minimizes the radiation exposure. It is now in use at Toronto's SickKids and Montreal's Ste. Justine hospitals.

Knott P et al. 2010 Comparing axial loaded MRI to standing radiographs in the evaluation of AIS. Scoliosis 2010 5(Suppl 1):O12

T. David Luo, MD, Anthony A. Stans, MD, Beth A. Schueler, PhD, A. Noelle Larson, MD "Cumulative Radiation Exposure With EOS Imaging Compared With Standard Spine Radiographs." *Spinal Deformity* (2014): n. pag. Web.

Bracing

Bracing is effective in halting progression of moderate curves while children are still growing. Braces are prescribed according to Scoliosis Research Society guidelines, based on the strongest evidence.
"We must tell patients it will work."— Dr. James Wright, former Surgeon-in-Chief, SickKids Hospital

Stuart L. Weinstein, M.D., Lori A. Dolan, Ph.D., James G. Wright, M.D., M.P.H., and Matthew B. Dobbs, M.D. "Effects of Bracing in Adolescents with Idiopathic Scoliosis" N Engl J Med 2013; 369:1512-1521October 17, 2013 http://www.nejm.org/doi/pdf/10.1056/NEJMoa1307337

A more modern version of the Chêneau brace, developed in Spain by Dr Manuel Rigo in 1999, provides three-dimensional correction, has a front closure, and is easier to wear. Good results have been documented for the **Rigo-Chêneau (RC) Brace**. Unfortunately, only a few orthotists have the training to make the RC Brace. The Providence night brace also offers 3D correction.

Gallo D, Wood G, Dallmayer R 2011 Quality Control of Idiopathic Scoliosis treatment in 147 patients while using the RSC brace. American Journal of Prosthetics and Orthotics, 23(2): 69-77

The RC Brace is complicated to make, but use of computer-aided design and manufacturing technology eliminates the need to make a plaster cast and greatly enhances accuracy of the brace.

Sankar WN, Albrektson J, Lerman L, Tolo VT, and Skaggs DL 2007 Scoliosis in-brace curve correction and patient preference of CAD/CAM versus plaster molded TLSOs. Journal of Children's Orthopaedics, 1(6): 345–349

(to avoid casting for teens Rodin 4 scanner could be used, orthotists (in rehab Center were asked) are not interested in this scanner as if they build a brace not by hand, braces will not be covered by ADP (assisted device program which covers 70% cost) the scanner may eliminate 1-2 jobs as saves time etc.

Unfortunately, in Canada, brace prescription protocols vary.

Hill, Douglas L, Eric C Parent, Edmond Lou, Marc J Moreau, James K Mahood, and Douglas M Hedden. "Brace Treatment for Adolescent Idiopathic Scoliosis – Protocols of the Canadian Spinal Deformity Study Group Surgeons." *Scoliosis*. Print.

Scoliosis-specific physiotherapy: international and Canadian evidence

In conjunction with bracing, or on its own, scoliosis-specific physiotherapy has been found to reduce the need for surgery. (See, for example, the latest consensus statement by the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT), pages 19-21.) OHIP covers physiotherapy services at the Ottawa & District Physiotherapy Clinic (with a doctor's referral), making this non-surgical option available to many. OHIP does not cover group physiotherapy and that is an extra cost for families for 1-3 years if they choose scoliosis specific Schroth group physiotherapy. However, although surgeons may recommend standard physiotherapy, pilates, yoga, and other activities for patients, they tend to overlook scoliosis-specific physiotherapy as a viable treatment option.

Scoliosis-specific physiotherapy has been shown to improve patients' scoliotic posture, vital capacity, muscular and postural balance and aesthetics. It can also be beneficial before and after spinal fusion surgery to improve vital capacity, balanced posture and aesthetics.

The effect of Schroth exercises added to the standard of care on the quality of life and muscle endurance in adolescents with idiopathic scoliosis—an assessor and statistician blinded randomized controlled trial: "SOSORT 2015 Award Winner"

Sanja Schreiber, Eric Parent, Elham Moez, Douglas Hedden, Doug Hill, Marc Moreau, Edmond Lou, Elise Watkins, Sarah Southon Scoliosis 2015, 10:24 (18 September 2015)