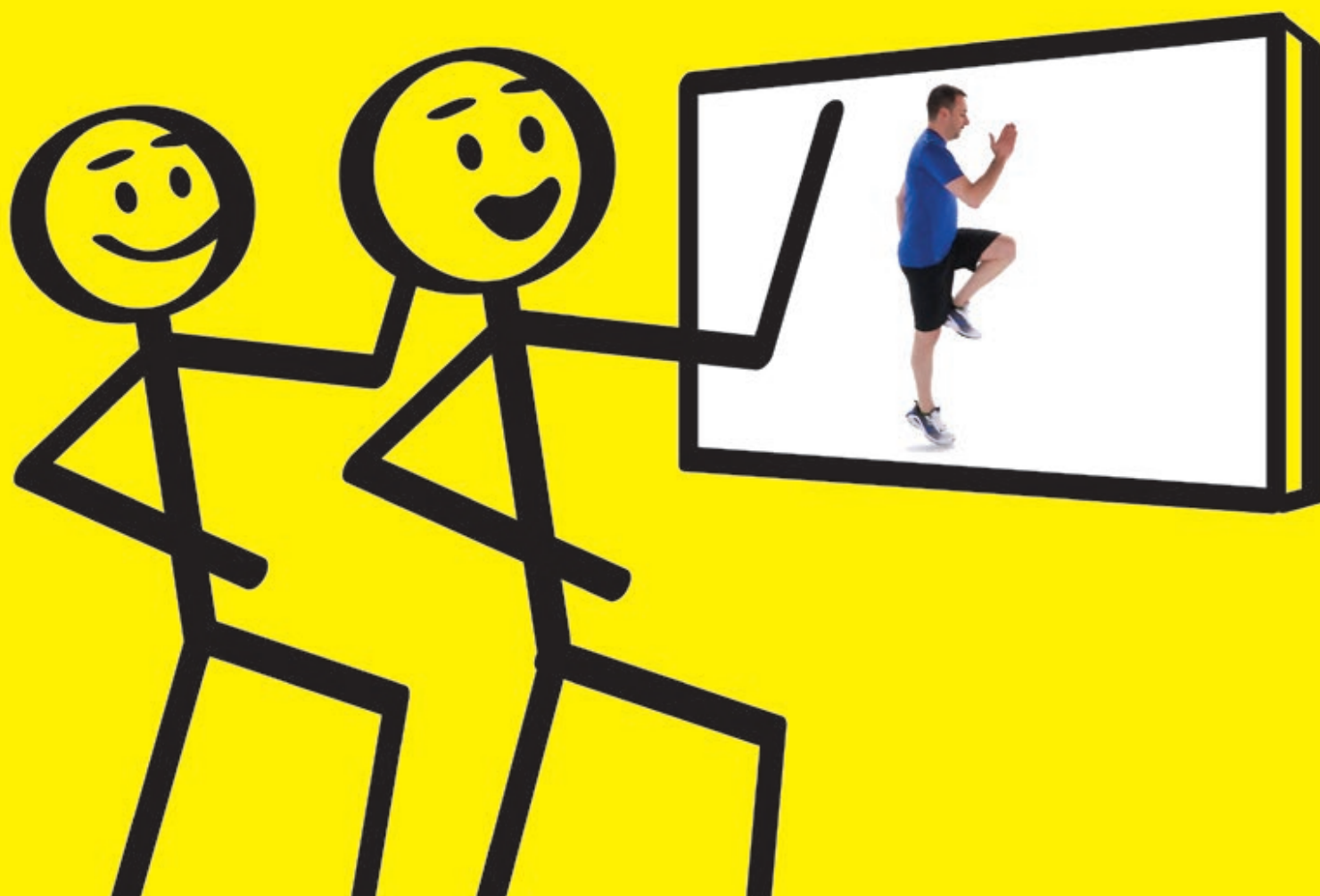


Scoliosis

InTouch


PHYSIO
EST. **FIRST** 1952

HAPPY DAYS ARE BACK



It's unanimous. Everybody's getting with the times and logging in to Physiotec's revolutionary way of showing patients how to do home exercises.

Do like stickmen worldwide and put Physiotec at the heart of your patient wellbeing. See how our custom designed video exercise programme can empower them and speed up their recovery time. With thousands of videos available plus our made-to-measure video option, we are redefining the way in which patients exercise their way back to health..

Get the full story on how we're changing the world of exercise programmes on stickmen.tv



+44 (0)2 032 865865
physiotec.co.uk
info@physiotec.co.uk

PHYSIOEC

Editorial



So, out of Africa we came, but how was it that humans, above all other creatures, became the one species to dominate the Earth and go from one that was on par with apes, to totally owning our planet?

Answer... co-operation and flexibility. We have achieved (if that is the right word) the ability to work together in large numbers to create amazing things through our co-operation with one another. Stick a thousand monkeys in a room and ask them to work together to produce something and it would be pandemonium. Ask humans to do it and, chances are, you would get something amazing. We alone, of all creatures, think above and beyond our monkey brains and, through co-operation, rise above.

And so, seventy thousand years later, here we are. Humans working together for the good of our fellow, like-minded humans and, for those of us who are Physio First members, it's for the good of our organisation. Think I am being over the top? Well we need to be just that to achieve our last, great goal to show ourselves to be **Quality Assured Practitioners (QAP)** and, where we can, set up co-operatives that will make Physio First members stronger and more forthright in the future healthcare market that is apparently hell bent on undermining the professional integrity that we have so long held. We are all aware of the changes and threats that shake us, but by working together and co-operating, we will be strong enough to face them. Watch this space, watch our website, watch our *Updates* and e-alerts, and join us at our business symposium with Rich Katz, Kyle Lunn, James Butler and our own Chairman, Pam Simpson, on Friday 31 March, and be informed about what we all can do to help the future of private physiotherapy through Physio First. Full details can be found on page 34.

This edition is marked by great articles, again by great individuals who give freely of both their time and energy; they include our authors, our volunteer post holders and our editorial team. Scoliosis is tough for those who have it and who strive for relief from its clutches and we hope that covering the subject will go some way towards helping you all to be better at caring for those who come to see you with this condition. Part of Physio First's mission has been to provide the best environment for its members to thrive and this includes the recently released **QAP** scheme, details of which can be found on pages 32 and 33 of this edition. Our aim is for *In Touch* to provide the education and advice that will act as two of the supporting planks for our members to use towards becoming **QAPs**.

Happy Christmas and here's to a great Physio First 2017.

PAUL JOHNSON | MSc BSc MMACP MCSP | EDITOR

Contents

- 4**__Adolescent idiopathic scoliosis: conservative management and treatment
Jason Black
- 10**__Pathological presentations of scoliosis and their management
Martin Matthews
- 16**__Physiotherapeutic scoliosis-specific exercise (PSSE) treatments for adults after discharge: self-perceived results
Amy Sbihli
- 20**__Scoliosis: a patient's perspective
Bernadette Johnson
- 28**__The gluteus minimus in hip function and dysfunction
Tania Pizzari and Adam Semciw
- 32**__Physio First's Quality Assured Practitioner scheme is launched
- 34**__Education
- 35**__Round-up

Editorial Panel



PAUL JOHNSON EDITOR
editor@physiofirst.org.uk

TOBIAS BREMER
SALU FELLOWS
LUCY HACKNEY
HELENA BOUGHTON
EDITORIAL ADMINISTRATOR
helena.boughton@physiofirst.org.uk

COVER IMAGE:
ISTOCK.COM/NECIP YANMAZ

Adolescent idiopathic scoliosis: conservative management and treatment

JASON BLACK BSc (Hons) MCSP

Clinical Manager, Scoliosis SOS

With contribution from **MICHAEL BRADLEY** BSc



Conservative management of scoliosis consists of either bracing or physiotherapeutic scoliosis-specific exercises (PSSE), and should initially be applied with the aims of limiting the progression of scoliosis above surgical thresholds and, in the longer term, of improving the patient's quality of life, pain and aesthetics. Bracing comes in all varieties; selected by a trained and experienced practitioner, it should be applied full time during the patient's adolescence and periods of growth. Exercise should be prescribed by a clinical expert and designed around curve-specific and proven modalities to target the individual's exact circumstances.

LEARNING OUTCOMES

- 1 Introduction to the aims of conservative management.
- 2 Recognition of use of bracing in the management of scoliosis.
- 3 Recognition of physiotherapeutic scoliosis-specific exercises.
- 4 Understanding resources available for further reference.

Aims of conservative management

The primary role of conservative scoliosis management is conventionally accepted as aiming to limit curve progression, especially during a patient's adolescent stages of growth (Weiss *et al* 2006a).

Typically, adolescent idiopathic scoliosis (AIS) does not, except in extreme cases, cause any significant health problems during growth. However, the resulting surface deformity frequently has a negative impact on the adolescent body image and self-esteem that can give rise to quality of life issues and, in worst cases, psychological disturbances.

While the treatment of scoliosis in adolescent patients is generally in an attempt to halt the progressive nature of the deformity, secondary complications can frequently be ignored or bypassed during initial assessment. No treatments succeed in absolute correction to a "normal" spine and even reduction of the deformity is difficult. If the scoliosis surpasses a critical threshold of a Cobb angle (Cobb 1948) of around 30°, the risk of health and social problems in adulthood increases significantly (Bettany-Saltikov *et al* 2014).

These problems can include reduced quality of life, disability,

pain, increased cosmetic deformity, functional limitations, sometimes pulmonary problems, and progression during adulthood. Because of this, management of scoliosis includes the prevention of secondary problems associated with the deformity.

In recent years, the consensus with regard to conservative management has changed and goals of treatment readdressed with the specific aims to show that the main focus of conservative management should be shifted from the precise measurement of the lateral curvature, to more socially relevant measures such as aesthetics, quality of life and pain (table 1).

Current knowledge in the UK and USA

A possible reason for the negative beliefs towards conservative management of scoliosis within the clinical community in western Europe and the USA is the lack of knowledge within the physical therapy community and associated clinical specialists. The teaching concerning scoliosis management at undergraduate and postgraduate level within the physiotherapy curriculum in the UK, Canada and the United States, to name a few, is minimal. Most clinicians, both

RANK	AIM	% OF RESPONDERS
1	Aesthetics	100%
2	Quality of life	91%
3	Disability	91%
4	Back pain	87%
5	Psychological wellbeing	84%
6	Progression in adulthood	84%
7	Breathing function	84%
8	Scoliosis Cobb degrees	84%
9	Need of further treatment in adulthood	81%

TABLE 1: Goals of treatment for scoliosis (Negri *et al* 2012)

"NO TREATMENTS SUCCEED IN ABSOLUTE CORRECTION TO A 'NORMAL' SPINE AND EVEN REDUCTION OF THE DEFORMITY IS DIFFICULT"

physiotherapists and surgeons in these jurisdictions, normally do not appreciate the difference between PSSE and general physiotherapy and the knowledge of bracing protocols is somewhat limited to specialist centres and clinics.

A study conducted by Drake *et al* (2014) of 178 physical therapist students in the USA demonstrated that in a multiple-choice questionnaire of 10 questions concerning diagnosis and management of scoliosis, the average score was 43% and only 8% of the participants answered at least 70% questions correctly. In a follow-up study conducted by Black *et al* (2016), 206 final-year physiotherapy students from universities in the UK were asked seven multiple-choice questions about their knowledge of scoliosis. Of these, 165 completed the entire questionnaire and only 7% answered at least four questions correctly. These results were similar those of a comparable study completed in Polish universities (Cziazynski *et al* 2008).

With an increasing drive towards self-referral to physiotherapy in the UK, it is essential to know the different conservative management inputs available to patients with scoliosis.

Aspects of conservative management

There are two primary approaches to conservative therapy in scoliosis that should be recognised and discussed further:

BRACING THERAPY

Bracing, or spinal orthotics, is widely regarded as the main non-surgical treatment of AIS during a patient's growth period and can occasionally be used for adult scoliosis. It is regularly used independently or in combination



FIGURE 1: Boston brace

with exercises (Weiss *et al* 2006b). The definition of bracing is the application of external corrective forces to the trunk. In the current era of bracing, there is not a commonly accepted approach and so expertise and experience dictates the approach taken by the individual therapist. This has led to the development of several different schools of thought on brace construction (Negri & Grivas 2010).

A number of different types of brace have been developed internationally. These are named, primarily through the town of their development, the name of the designer, or their specific, theoretical approach. The braces traditionally available in the USA and the UK are the rigid Boston braces (figure 1), the flexible Spine-Cor braces (figure 2) and the more historically and now less frequently used Milwaukee Brace.

Throughout Europe there has been significant progress and development in relation to brace design and research, including that undertaken with the Lyon,

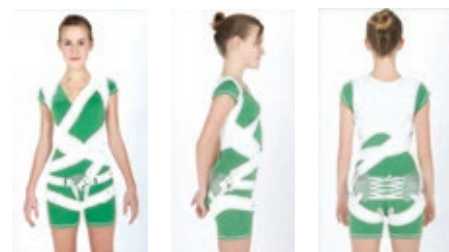


FIGURE 2: Spine-Cor brace

Sforzesco, Ginsengen and Cheneau braces.

No matter the type of brace applied, two issues prevail when considering the effectiveness of bracing treatment: compliance and prescription.

Compliance is imperative to successful bracing care and is incredibly hard to measure. It is usually accepted that the patient's and, where appropriate, their parents' report of how many hours a day the brace is worn is a reliable figure, and those who confess to non-compliance tend to have worse results from bracing treatment (MacLean *et al* 1989).

Some braces have been developed which can help monitor the compliance of the patient through the measurement of temperature or humidity sensors.

Another major issue with regard to the effectiveness of a brace is the prescribed time of wear on a daily basis. This treatment time can vary dramatically, but it is generally accepted and 📌

"THE KNOWLEDGE OF BRACING PROTOCOLS IS LIMITED TO SPECIALIST CENTRES AND CLINICS"

"OPINION ON PHYSIOTHERAPEUTIC SCOLIOSIS SPECIFIC EXERCISES IS DIVIDED"

recommended to be 23 hours a day in patients during main growth periods. The effectiveness of part-time bracing has been questioned heavily in recent years (Negrini & Grivas 2010).

THE BrAIST STUDY

In 2013, several medical centres joined together to perform a randomised controlled trial (RCT) to investigate whether bracing was effective in adolescents with curves between 20 and 40 degrees (Weinstein *et al* 2013). They set about to study not only if bracing therapy was successful in limiting curve progression to 50 degrees, but also to highlight what factors affected treatment success.

Known as the "BrAIST Study", it was the first of its kind and conclusively highlighted that, when bracing therapy was applied correctly with patients in high risk of progression to surgery, 72% of brace wearers could avoid surgical recommendations, compared to only 48% of patients in the observation group.

Alongside this, the authors highlighted both the importance of bracing compliance and treatment time, showing that as the brace wear time increased, so did the success rate (figures 3 and 4).

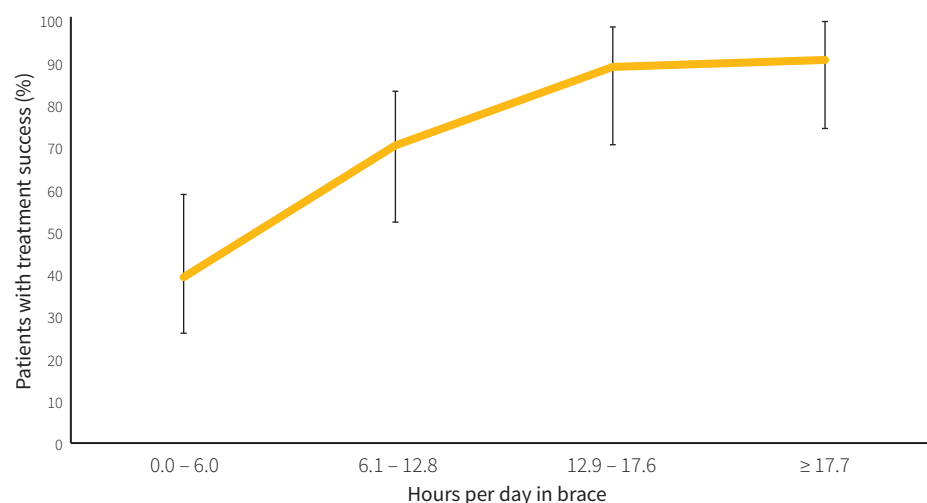


FIGURE 3: Rate of treatment success according to hours of daily brace wear (Weinstein *et al* 2013)

TREATMENT	SUCCESS (%)	FAILURE (%)	TOTAL
Brace	38 (74.5)	13 (25.4)	51
Observed	27 (41.5)	38 (58.5)	65
Total	65 (56.0)	51 (44.0)	116

FIGURE 4: Results of BrAIST study (Weinstein *et al* 2013)

PHYSIOTHERAPEUTIC SCOLIOSIS SPECIFIC EXERCISES

In contrast to the large amount of high-level research in place to support the application of bracing therapy in the treatment of scoliosis, opinion on physiotherapeutic scoliosis specific exercises (PSSE) is far more divided among international specialists. In fact the guidelines from the Scoliosis Research Society (SRS) state: "Alternative treatments to prevent curve progression... such as chiropractic medicine, physical therapy, yoga, etc. have not demonstrated any scientific value in the treatment of scoliosis. However, these and other methods can be utilized if they provide some physical benefit to the patient such as core strengthening, symptom relief, etc. These should not, however, be utilized to formally treat the curvature in hopes of improving the scoliosis" (SRS 2016).

The recently published Society of Scoliosis Orthopaedic Rehabilitation

and Treatment (SOSORT) guidelines recommend, given the perceived risk of progression based on the patient's age, skeletal maturity and curve severity, the use of PSSE as part of a range of interventions deemed appropriate, depending on the patient's and therapist's willingness to consider more or less aggressive options. In skeletally immature patients, i.e. those measured on the Risser sign (2010) of 3 or less, with curves between 11 degrees and over 30 degrees, and in skeletally mature patients measured at Risser 4 or 5 with curves from 11 to 45 degrees, SOSORT suggests exercises to pursue the following goals:

- to stop, or reduce curve progression at puberty
- to prevent or treat respiratory dysfunction
- to prevent or treat spinal pain syndromes
- to improve aesthetics via postural correction.

Further, when patients are prescribed a rigid brace, SOSORT always recommends the associated use of PSSE.

The main issue with PSSE when faced with the research is the lack of distinction within the literature between scoliosis specific exercises, general exercises, osteopathy, yoga etc., thus care should always be taken to apply proven and researched approaches with implementation of specific principles (Rigo & Grivas 2010). The latter generic exercises tend to consist of low impact stretching and strengthening activities, whereas the more specific PSSE are a



FIGURE 5: The Schroth method (Weiss 2011), practiced here at the Barcelona Scoliosis Physical Therapy School (BSPTS)



FIGURE 6: The scientific exercise approach to scoliosis (SEAS) (Romano *et al* 2015)



FIGURE 7: The functional individual approach to scoliosis (FITS) (Bialek 2011)

programme of curve-specific protocols individually adapted in response to the magnitude, site and characteristics of the individual patient's curve (Bettany-Saltikov *et al* 2014).

Traditionally accepted, widely used and recommended therapeutic approaches are available, all of which follow the four standard features described in the 2005 SOSORT consensus paper (Weiss *et al* 2006b):

- a) patient and family education
- b) 3D self-correction
- c) stabilisation in correction
- d) training in activities of daily living.

There are also a number of international centres that are totally dedicated to the treatment of scoliosis with the use of PSSE where, following medical evaluation, patients are taught exercises that are adapted to them and that can be incorporated into their daily living. These traditional schools of PSSE follow various methods devised by international research including the Schroth method (figure 5), the scientific exercise approach to scoliosis (SEAS) (figure 6), the Dobosiewicz method (Dobomed), the functional individual approach to scoliosis (FITS) (figure 7), the Lyon school, and the side shift method.

There are five main clinical conditions for which PSSE can be used:

1) Through sole use, as the primary treatment of AIS for mild curves, to limit and / or decrease progression and to try to avoid the use of a brace.

2) Before wearing a brace to improve the mobility and the elasticity of the spine and the trunk in order to obtain a better correction by the pressures of the brace pads.

3) In conjunction with the brace in order to reduce the side-effects such as muscle weakness, rigidity and flat back. The efficacy of internal brace pads can be improved with PSSE and exercises also help avoid the loss of 3D correction during the process of weaning off the brace.

4) During adulthood, if the scoliosis curves exceed certain thresholds, PSSE can help with any significant problems that may arise such as back pain, breathing dysfunction, contractures and progressive deformity.

5) Before and after surgical correction. Before surgery, the aim of PSSE is in maintaining the mobility of the curve to help achieve maximal correction during surgery. Post-surgery PSSE would aim to enhance the effects of surgery on back shape, balance and posture (Bettany-Saltikov *et al* 2014).

Summary

The level of evidence in the conservative management of AIS is high and is growing every year. Landmark pieces of research such as the BrAIST study are paving the way for further exploration into the conservative management of scoliosis and laying the foundations for a future that will be less focused on surgical intervention. It is widely recognised that a more holistic approach is required to treat the complexity of

issues and concerns that arise with the diagnosis of scoliosis.

The approach to scoliosis care should focus on evidence-based clinical practice (figure 8), the consequence of which will be that one patient's clinical experience can vary through treatment by different clinicians. Consideration should always be paid to the patient's own preferences, as well as the clinician's own personal experiences, especially when considering application of both bracing and PSSE.

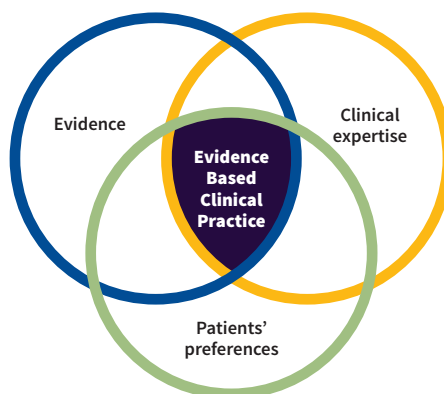


FIGURE 8: Evidence-based clinical practice (Negri *et al* 2012)

The Society of Scoliosis Orthopaedic Rehabilitation and Treatment (SOSORT) is an international society that was initially founded to develop research in the field of conservative management of scoliosis and it continues to promote clinical care through open access distribution of guidelines into the orthopaedic rehabilitation and treatment of idiopathic scoliosis.

The most recent guidelines were produced in 2011 (Negri *et al* 2012) ➔

"CARE SHOULD ALWAYS BE TAKEN TO APPLY PROVEN
AND RESEARCHED APPROACHES"

but are currently being updated for release in late 2016 proving that research into this field is evolving, with Level 1 evidence into bracing, and several research studies thrusting increased focus into the application of PSSE by trained and experienced practitioners, using methods other than "usual physiotherapy" (Fusco *et al* 2011).

About the author

Jason Black currently works as Clinical Manager and physiotherapist at Scoliosis SOS, London. He has worked predominantly with patients suffering from scoliosis and hyper-kyphosis for more than six years, treating more than 1,000 patients in this time.

Registered with both the CSP and HCPC, Jason has travelled internationally to further his knowledge of scoliosis and is a registered practitioner in the ScolioGold Method (UK), FITS Method (Poland) and SEAS Method Level I and II (Italy). He is also an accredited Dynamic Movement Orthotics and Langer Orthotics Practitioner.

Jason is a member of the Communication Committee for the SOSORT and has presented research at SOSORT conferences in Weisbaden, Germany (2014) and Banff, Canada (2016) as well as being a guest lecturer at many hospitals and universities in the UK.

CONTACT DETAILS

jasonblack@scoliosissos.com

Phone: (+44) 207 488 4428

Website: www.scoliosissos.com

For further information:

Scoliosis SOS: www.scoliosissos.com

Society of Scoliosis Orthopaedic Rehabilitation and Treatment (SOSORT): www.sosort.mobi

SRS Adolescent Idiopathic Scoliosis: <https://www.srs.org/professionals/online-education-and-resources/conditions-and-treatments/adolescent-idiopathic-scoliosis>

References

Bettany-Saltikov J, Parent E, Romano M, Villagrasa M. Physiotherapeutic scoliosis-specific exercises for adolescents with idiopathic scoliosis. *European Journal of Physical Rehabilitation Medicine* 2014;50(1):111-21

Bialek M. Conservative treatment of idiopathic scoliosis according to FITS concept: presentation of the method and preliminary, short term radiological and clinical results based on SOSORT and SRS criteria. *Scoliosis* 2011;6:25

Black J, Bradley M, Drake S, Glynn D, Maude E. *Current knowledge of scoliosis in physical therapy students trained in the United Kingdom*. SOSORT Conference, Banff 2016

Cobb JR. Outline for the study of scoliosis. *American Academy of Orthopedic Surgeons*. 1948;7:261-275

Cziazynski D, Czernicki K, Durmala J. Knowledge about idiopathic scoliosis among students of physiotherapy. *Studies in Health Technology and Informatics* 2008;140:281-285

Drake S, Glidewell M, Thomas J. Current knowledge of scoliosis in physical therapy students trained in the United States. *Scoliosis and Spine Disorders* 2014;9(1):O64

Fusco C, Zaina F, Atanasio S, Romano M, Negrini A, Negrini S. Physical exercises in the treatment of adolescent idiopathic scoliosis: an updated systematic review. *Physiotherapy Theory and Practice* 2011;27(1):80-114

MacLean W, Green N, Pierre C, Ray D. Stress and coping with scoliosis: psychological effects on adolescents and their families. *Journal of Paediatric Orthopaedics* 1989;9(2):257-61

Negrini S, Grivas T. Introduction to the "scoliosis" journal brace technology thematic series: increasing existing knowledge and promoting future developments. *Scoliosis and Spinal Disorders* 2010;5(2)

Negrini S, Aulisa A, Aulisa L, Circo A, de Mauroy JC, Durmala J, Grivas T, Knott P, Kotwicki T, Maruyama T, Minozzi S, O'Brien J, Papadopoulos D, Rigo M, Rivard C, Romano M, Wynne J, Villagrasa M, Weiss HR, Zaina F. 2011 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. *Scoliosis and Spinal Disorders* 2012;7:3

Negrini S, Fusco C, Minozzi S, Atanasio S, Ziana F, Romano M. Exercises reduce the progression rate of adolescent idiopathic scoliosis: Results of a comprehensive systematic review of the literature. *Disability and Rehabilitation* 2008;(10)30:772-785

Rigo M, Grivas T. Rehabilitation schools for scoliosis thematic series: describing the methods and results. *Scoliosis and Spinal Disorders* 2010;5:27

Risser JC. The Iliac apophysis; an invaluable sign in the management of scoliosis (reprint of 1958 article). *Clinical Orthopaedics and related research* 2010;468(3):646-653

Romano M, Negrini A, Parzini S, Tavernaro M, Zaina F, Donzelli S, Negrini S. SEAS (Scientific Exercises Approach to Scoliosis): a modern and effective evidence based approach to physiotherapeutic specific scoliosis exercises. *Scoliosis and Spinal Disorders* 2015;10:3

Weinstein S, Dolan L, Wright J, Dobbs M. Effects of bracing in adolescents with idiopathic scoliosis. *New England Journal of Medicine* 2013;369:1512-1521

Weiss HR. The method of Katharina Schroth – history, principles and current development. *Scoliosis and Spinal Disorders* 2011;6:17

Weiss HR, Negrini S, Rigo M, Kotwicki T, Hawes M, Grivas T, Maruyama T, Landauer F. Indications for conservative management of scoliosis (guidelines). *Scoliosis and Spinal Disorders* 2006a;1:5

Weiss HR, Negrini S, Hawes M, Rigo M, Kotwicki T, Grivas T, Maruyama T. Physical exercises in the treatment of idiopathic scoliosis at risk of brace treatment – SOSORT consensus paper 2005. *Scoliosis* 2006b;1:6



We have the widest choice
of shockwaves to meet
your budget and
requirements

THE ENDOPULS 811 SHOCKWAVE THERAPY UNIT



Made by Enraf Nonius, Manufactured in Holland
Fully supported & CE Marked

A compact and complete shockwave unit
This fully equipped shockwave package comes with
four heads and some of the lowest operating costs of
any shockwave machine on the market

**MOBILE • CLEAR TOUCHSCREEN DISPLAY
LONG LIFE • EASY MAINTENANCE**

AMAZING VALUE!
The Endopuls 811
Shockwave unit
ONLY £4,295.00 + VAT



ShockMaster 500



GymnaUniphy
YOUR PHYSIO COMPANY

ShockMaster 300



Electrotherapy & Shockwave courses available, see our website for details

Tel: 0115 965 6634 **www.phoenix-healthcare.co.uk** **Email:** info@phoenix-healthcare.co.uk



**SOCIETY OF
MUSCULOSKELETAL
MEDICINE**
putting theory into practice

SOMM Diploma in Musculoskeletal Medicine

Our courses blend sound theoretical
knowledge with a highly practical element
enabling you to: Advance your clinical
reasoning skills, apply functional anatomy
and develop mastery in manual therapy and
injection techniques.

**The SOMM Diploma in Musculoskeletal
Medicine is accredited by Middlesex
University and the Chartered Society
of Physiotherapy.**

If you have any queries please contact
SOMM by telephone **0151 237 3970** or
email jennifer.ohlsson@sommcourses.org

www.sommcourses.org

DIPLOMA MODULE DATES - 2017

Module A

18 - 19 Mar & 1 - 2 Apr 2017	Birmingham
26 - 29 Jun 2017	Liverpool
16 - 17 & 30 Sep & 1 Oct 2017	Glasgow

Module B

28 Feb & 1 - 3 Mar 2017	Liverpool
6 - 7 & 20 - 21 May 2017	Glasgow
8 - 9 & 22 - 23 Jul 2017	Birmingham

Module C

23 - 27 Oct 2017	Liverpool
18 - 19 Nov & 2 - 4 Dec 2017	Birmingham

ADVANCED MODULE DATES - 2017

Special Tests

3 - 4 Feb 2017	Liverpool
----------------	-----------

Injection Therapy

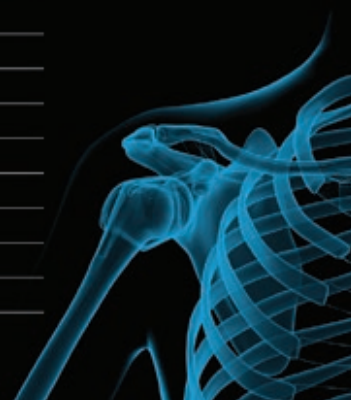
Unit II 25 - 26 Apr 2017	Liverpool
Unit I 27 - 29 Apr 2017	Liverpool
Unit II 21 - 22 Nov 2017	Liverpool
Unit I 23 - 25 Nov 2017	Liverpool

Advancing Clinical Practice

15 - 17 Jun & 8 - 9 Sep 2017	Liverpool
------------------------------	-----------

**MORE
DATES TO
BE CONFIRMED**
check out
sommcourses.org
for updates

**BOOK
ONLINE
NOW**



Pathological presentations of scoliosis and their management

MARTIN MATTHEWS MPhil MBAPO

Clinical Specialist Orthotist



The presentation of scoliosis can be divided into two main types: neuropathic and adolescent idiopathic. Management has markedly improved over recent years, particularly with the consensus documents published by the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) providing a thorough review of good practice. This highlights the importance for early intervention including physiotherapy linked in with brace management and surgery. This article will review the current state of play and discuss the pertinent options available in current management strategies and challenge historic orthotic spinal intervention treatment practices based on evidence-based practice and cost-effective clinical provision.

LEARNING OUTCOMES

- 1 Be aware of the differentiation of main scoliosis presentation.
- 2 Review current orthotic management.
- 3 Understand the evidence for the use of dynamic orthotics.

Introduction

There are two main scoliosis pathological presentations:

- neuropathic onset scoliosis
- adolescent idiopathic scoliosis (AIS).

Neuropathic onset scoliosis, as classified by the Scoliosis Research Society, involves both central and / or peripheral motor neuron involvement (Vialle *et al* 2013). It includes children with cerebral palsy (CP), particularly those reported to be classified under the Gross Motor Functional Classification Scale (GMFCS) Levels 4 & 5 (Garg *et al* 2013), although it can occur in more ambulant children with a lower classification. Children with Rett Syndrome also present with a particularly aggressive form of scoliosis (Riise *et al* 2011). Neuropathic onset scoliosis can be attributed to disharmonious muscle control of the truncal supporting structure which sets up particular compressive forces within

the vertebral structures leading eventually to vertebral wedging.

Adolescent idiopathic scoliosis is more commonly understood as it appears to be directly linked to the adolescent spinal growth spurt initiating around the age of 11 onwards and affects 3% of the population worldwide (Hayes *et al* 2014). This form of scoliosis tends to have a higher profile in the press due to the effect on seemingly healthy young girls (Driscoll & Skinner 2008). The causes are reported to be genetic with familial history or idiopathic in origin. Recent research into zebrafish presenting with scoliosis has been linked to genetic coding and therefore suggests a similar effect in humans (Hayes *et al* 2014).

The mechanisms involved are typically similar in the end result, but have different origins. The way in which we sit and walk are learned patterns, based on repetition over many years and the root of sitting position is based on our early learned experiences. This is particularly relevant in children with cerebral palsy who present with low core stability, showing flared ribs at T10-12 levels and protracted shoulders (Massey 1991). This presentation is a good indicator of low core stability. To enable the child to eat, their head must be stable and supported, otherwise mastication is not possible. Without intervention the

child, due to a lack of truncal control, tends to develop their own strategy for obtaining this stability, often noticed as a kyphotic sitting position, coupled with sacral sitting which can develop into the typical “C” shaped neurological curve, with increased weight bearing on one hip. Protracted shoulders also impede the upper limb range of motion and function, reducing effective hand and arm function development.

There is increasing evidence to support the fact that truncal control is an important determinant of motor function, and suggests that there is a relationship between the control of individual spinal segments affecting mobility and gross motor function (Curtis *et al* 2015). These children often sit with posterior sitting position, where the centre of gravity should be above or behind the ischial tuberosity, with only 25% of the body weight transferred to the feet. Sitting for extended periods can lead to structural changes in the spine, changing a postural scoliosis to a structural curve in a relatively short time. In addition to the structural changes, long periods of sitting can initiate changes in the central nervous system causing some compressional changes on the spinal cord (Harrison *et al* 1999) and some patients experience leg and hip muscle contractions due to the combination of growth and postural positioning.

"PROLONGED SITTING IN A POOR POSITION BECOMES EMBEDDED IN THE BRAIN AS A LEARNED POSITION OF NORMALITY, WHICH CONTINUES AS A VICIOUS CYCLE OF POOR POSITION INFORMING A CHANGED IMAGE OF SELF"

Prolonged sitting in a poor position becomes embedded in the brain as a learned position of normality, which continues as a vicious cycle of poor position informing a changed image of self (Kurz *et al* 2014; Duff & Gordon 2003; Mutsaerts *et al* 2006; van Elk *et al* 2010). Children with CP have an altered image of their body position in space, which is due to the effects of the infarct to the brain. This results in the development of a poor internal model, which is maintained and updated continually. This information is used to predict the sequential muscle activation required to complete a specific task, therefore over time the movement management is made harder as more complex movements and controls are required.

The mechanisms of vertebral growth disruption are similar in both neurological and AIS presentations. In neurological onset, it is the imbalance in the anti-gravity muscles, and in AIS, the intra-spinal muscles cause an asymmetrical loading on the intervertebral discs resulting in asymmetrical growth in the vertebra. A vicious cycle (Stokes *et al* 2006) of proprioceptive learning and spinal decomposition (Kurz *et al* 2014) continue the development of scoliosis. The trigger in AIS is now often regarded as genetic in origin; however, there is evidence of the pathogenic interference (Hayes *et al* 2014).

Spinal curves continue to progress due to the act of gravity and muscle inability to stabilise the spine, leaving surgery as the only option. Surgery often removes all rotatory movement within the spine as the fusion often extends from the hips upwards, incorporating most of the spine. Until recently, it was accepted that all children with GMFCS Level 4/5 CP would require surgery to prevent further deformity (Graham 2013). However, based

on more recent data, this may change in the future (Matthews *et al* 2016).

Intervention

While there is a consensus on the use of physiotherapy and orthotic interventions for AIS (Negrini *et al* 2012), recent literature offers no convincing evidence for the effectiveness of spinal orthotic intervention in relation to neuropathic onset scoliosis. SOSORT is currently updating the original consensus 2011 document to reflect the heightened use of early intervention physiotherapy in scoliosis management based on the outcomes of Schroth (Lehnert-Schroth 2007) and other therapeutic treatment protocols.

Until recently, very few physiotherapists practiced the Schroth system, so specific, scoliosis aggressive exercise programmes tended to be provided in centres of spinal expertise. However, as therapy has evolved in Europe, the outcomes of earlier intervention have become accepted. Children with CP now have exercise programmes based on the neurophysiological development training (NDT), but until recently, rigid bracing was the only option.

The case for early treatment of children with neurological onset scoliosis is of prime importance as early proprioceptive learning can have a profound effect in later life. The use of rigid orthotic devices to provide correction and stability to the spine can be traced back to 990AD and the first spinal jacket made of cork bark by the pre-Columbian Indians (Edwards 1952). The modern variants, although made from thermoplastics, adhere to similar principles of providing distraction to extend the spine to release pressure on nerves to reduce pain and provide stability.

At the turn of the millennium, routine management still involved rigid brace provision to stabilise the spine and enable an improved sitting posture in wheelchairs. While this was aimed at an improved quality of life (Allam & Schwabe 2013), compliance was a huge issue (Tsirikos 2010) as children experienced discomfort from the skin pressures around sites of brace fixation, around the anterior superior iliac crest, and were unable to move within the brace. Semi-rigid braces were more comfortable to wear, but only for short periods as the closed cell construction meant they became extremely hot.

Historically, spinal brace intervention has been prescribed only when the spinal curvature, measured by Cobb Angle, approaches 25 degrees. By delaying orthotic intervention, the mobile curve develops into a more rigid structural curve presentation with vertebral wedging, with increased resistance to counter rotational and translational forces. Rigid orthoses aim to stabilise the Cobb angle, maintain typical sagittal plane equilibrium and reduce curve progression. A positive outcome for brace treatment is the maintenance of the original curve at the end of the treatment, often three to four years in the future.

Although good in theory and practice for AIS, where curve progression is linked ➤

"THE CASE FOR EARLY TREATMENT OF CHILDREN WITH NEUROLOGICAL ONSET SCOLIOSIS IS OF PRIME IMPORTANCE"

“THE TRIGGER FOR THE CHANGE IS NOW OFTEN DESCRIBED AS GENETIC, RATHER THAN TRUE ‘IDIOPATHIC’ IN ORIGIN DUE TO IMPROVING GENETIC SCIENCE”

directly to increased spinal growth in the adolescent years, and where two thirds of growth occurs in the spine compared to a third of growth in the lower limb (Huelke 1998), this method is flawed in the management of neurological onset scoliosis, as the rate of progression is faster. The trigger for the change is now often described as genetic, rather than true “idiopathic” in origin due to improving genetic science.

The improvement in neurological onset cases is dependent on spine mobility and the expertise of the orthotist in taking the corrective cast. As rigid bracing physically prevents any rotary movement in the spine and uses distraction to force spinal symmetry, clinics that have access to “Stryker” frames tend to obtain better results than clinics that are forced to resort to suspending patients between two tables. The Stryker frame enables the client to be balanced on a high tensile webbing band passing longitudinally between the pelvis and shoulders coupled with the stabilisation of the shoulders and pelvis to prevent sideways movement. As this has the ability to distract the spine, reduce rotation and pelvic fixation in a more controlled manner, the outcomes are much improved. Rigid braces achieve short-term changes to the Cobb angle; however, over the long term, the curves continue to worsen, with excessive rotation occurring when the spine deteriorates. Clinically for years, the author has noted that corrective casts were repeated on an annual basis as the curves worsened despite best clinical practice. The reason was that the scoliosis was of a neuropathic origin, and due to asymmetrical muscle balance and control. The children would eventually require scoliosis surgery. Inevitably, all of these cases progressed to surgical intervention.

The mainstay for rigid bracing of AIS has been the Boston Brace (Hall *et al* 1976),

which has been used for the past 30 years. The Boston brace differs from cast bracing as it is based around the modular model of using a symmetrical base brace which is adapted for each patient by experienced orthotists. There are a numerous variety of spinal braces in current use. Some, such as the Providence, use a system of night-time positioning and over-correction of the curve that does appear to get results, mainly due the fact that the spine is not under the effects of gravity while it is worn, and there is a resultant compressive effect preventing bone growth. Other braces, including the Charleston, use daytime over-compensation and, more recently, the Cheneau brace has appeared in various guises. It provides pelvic fixation in the same way as the Boston brace (Zaborowska-Sapeta *et al* 2011) but uses a point loading effect linked in to forced inspiration and Schroth-style physiotherapy (Lehnert-Schroth 2007) to open and mobilise the various vertebral components of the spine. This latter brace is known for the voids into which the patient actively breaths and this is coupled with improved compliance and outcomes.

For children with a progressive curve and adolescents with scoliosis over 50 degrees, the only option left is invasive spinal surgery under general anaesthetic. This is major surgery, often taking all day to complete, and evidence from the recent audit suggests there is a complication rate of 33% in this presentation, with six children out of 16 who had surgery experiencing complications including rod breakages and infection. It should be noted that this sort of surgery removes most of the spinal rotation as invariably the T11/12 vertebrae are fused, removing the majority of thoracic spinal rotation. In 2013, the total cost of each case of surgery for a child with CP was reported to be US\$50K-73K (£32K-48K) (Diefenbach *et al* 2013).

Over the last 20 years, a new concept of treatment has been developed using dynamic elastomeric fabric orthoses (DEFO) and is beginning to be used in neuropathic onset scoliosis. These “scoliosis suits” (figure 1) are close fitting, breathable, enable translation panels to control the spinal asymmetry, and over-the-shoulder compression panels



FIGURE 1: Postural scoliosis suit (DMO Medical www.dmorthotics.com)

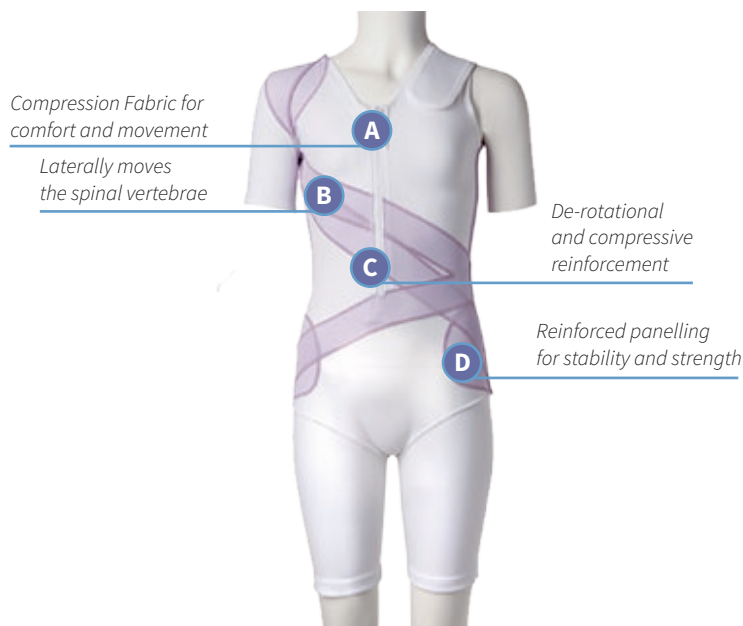


FIGURE 2: Structural scoliosis suit (DMO Medical www.dmorthotics.com)

can counter de-rotational elements of scoliosis (Matthews & Crawford 2006). The translation and de-rotational panel strength is dictated by the force required to correct the spine to a more symmetrical position. Early intervention is encouraged as less force is required to counter the scoliosis curves.

Evidence suggests that early intervention and by utilising the improved compliance, scoliosis curves could be controlled, if not reduced, in children with GMFCS Level 4 (Matthews *et al* 2016). For cases at GMFCS Level 5, the scoliosis suits tend to be of a more structural presentation (figure 2) with the aim of slowing progression and enabling the eventual surgery to be carried out on more skeletally mature bone. The suits combine the therapeutic principles of enhanced proprioception (Sawle *et al* 2014) with spinal compression, downward compression on the shoulders and firm fixation at the pelvis. Postural stability appears to be improved.

The mechanism used in DEFOs has been postulated to cause a reactive change by affecting body spatial awareness due to the enhanced proprioceptive responses. For individuals with CP, it appears to be possible to enable a process of neuro-plastic retraining of proprioceptive awareness. As previously mentioned,

because of a lack of antigravity muscle strength, resulting in atypical sitting positions, children with neurological onset scoliosis, or at risk of progressing to develop a curve, will present with low tone particularly evident in their abdominal muscles and notes as flared ribs (Massey 1991). As sitting is a learned pattern, this can be linked to the internal image of self as previously described. Use of scoliosis suits will, over time, provide the effect of a long, slow, continual stretch, known to be the best form of muscle stretching (Pin *et al* 2006). This effect works on the concave aspect of the curve and compression on the convex side, as well as producing a de-rotational element to unwind the thoracic vertebral rotation seen in most of the longer-term scoliosis curves. In a recent review of clinical evidence, the methodology appears to have a place in prevention and management of paediatric neuropathic scoliosis, perhaps offering an alternative to rigid bracing in children with mild / moderate neuropathic scoliosis. The vast majority of the children prescribed DEFOs were compliant with wear. Only three of 121 children wearing the DEFO stopped wear over the course of the audit timeframe. Children whose scoliosis either improved or was maintained were all managed with a DEFO. In all of these cases, scoliosis was classified as mild or moderate (Matthews *et al* 2016).

Long-term compliance in idiopathic scoliosis orthosis, reported in the recent BrAIST report, confirmed that, providing compliance is good, there is clear evidence of reductions of curve progression (Weinstein *et al* 2013). It is likely that this is also the case in neuropathic onset scoliosis, and the scoliosis suits are now starting to be used for AIS presentation, although no rigorous research has been carried out in this presentation to date.

Conclusion

The key common strand throughout the treatment of differing scoliosis presentations is the need to maintain a flexible spine. The more mobile the spine, the easier it is to correct and retrain the patient's brain in relation to adopting true body posture, rather than rely on older learned patterns. Physiotherapy techniques appear to work well with dynamic orthotic intervention, and physiotherapists trained in spinal decompensation techniques can offer more effective intervention; however, this is an area requiring increased research and long-term data reviews.

About the author

Martin qualified in 1981 as an orthotist from Salford Polytechnic College before moving to Norwich in 1991. He developed his speciality in paediatrics and scoliosis management, working closely with other allied health professions in combined therapy / orthotics clinics at the Norfolk & Norwich University Hospital NHS Trust.

He has always encompassed innovation in the field of orthotics and has developed, over the past 18 years, the use and design options of dynamic elastomeric fabric orthoses (DEFOs). In 2008, he gained a research master's degree from the University of East Anglia, investigating the effects of DEFOs on the child with diplegia. Martin has presented internationally at numerous orthotic and physiotherapy conferences on scoliosis orthotic intervention in children with neuropathic onset scoliosis. He has published ➤

numerous papers in international peer reviewed journals and presented at many international conferences for orthotics and physiotherapy, including AACPDM, SOSORT, ISPO, BAPO and AAOP academic meeting.

Until recently, he was the orthotic external examiner for the University of Salford Orthotic and Prosthetic degree course. He is also an associate lecturer at the University of Plymouth. Martin is responsible for the research and development at DM Orthotics Ltd, developing further the uses and functions of DEFOs in the field of sports, neurological dysfunction and musculoskeletal rehabilitation corroboration with several universities from around the world.

CONTACT DETAILS

m.matthews@dmorthotics.com
www.dmorthotics.com

References

- Allam AM, Schwabe AL. Neuromuscular scoliosis. *American Academy of Physical Medicine and Rehabilitation* 2013;5:957-63
- Curtis DB, Butler P, Saavedra S, Bencke J, Kallemose T, Sonne-Holm S, Woolacott M. The central role of trunk control in the gross motor function of children with cerebral palsy: a retrospective cross-sectional study. *Developmental Medicine and Child Neurology* 2015;57:351-7
- Diefenbach C, Ialenti MN, Lonner BS, Kamerlink JR, Kushagra V, Errico TJ. Hospital cost analysis of neuromuscular scoliosis surgery. *Bulletin of the Hospital for Joint Disease* 2013;71(4):272-7
- Driscoll SW, Skinner J. Musculoskeletal complications of neuromuscular disease in children. *Physical Medicine and Rehabilitation Clinics of North America* 2008;19(2008):163-94
- Duff SG, Gordon AM. Learning of grasp control in children with hemiplegic cerebral palsy. *Developmental Medicine and Child Neurology* 2003;45:746-57
- Edwards J. *Orthopaedic Appliances Atlas*. Arbor A (ed). Michigan, Edwards Brothers 1952:2-11
- Garg SE, Engelman G, Yoshihara H, McNair B, Chang F. The relationship of gross motor functional classification scale level and hip dysplasia on the pattern and progression of scoliosis in children with Cerebral Palsy. *Spine Deformity* 2013;1:266-71
- Graham KH (ed). The right treatment for the right child. *American Academy of Cerebral Palsy and Developmental Medicine* Milwaukee, Elsevier 2013
- Hall JM, Miller ME, Cassella MC. *Manual for the Boston Brace Workshop*. Children's Hospital Medical Centre, Boston 1976
- Harrison DC, Cailliet R, Harrison DD, Troyanovich SJ, Harrison SO. A review of biomechanics of the central nervous system. Part II: spinal canal deformations caused by changes in posture. *Manipulative and Physiology Therapeutics* 1999;22:227-34.
- Hayes MG, Gao X, Lisa XY, Paria N, Henkelman RM, Wise CA, Ciruna B. ptk7 mutant zebrafish models of congenital and idiopathic scoliosis implicate dysregulated Wnt signalling in disease. *Nature Communications* 2014;3(5):4777
- Huelke D. An overview of anatomical considerations of infants and children in the adult world of automobile safety design. *42nd Annual Proceedings of the Association for the Advancement of Automotive Medicine* 1998;42:93-113
- Kurz MB, Becker KM, Heinrichs-Graham E, Wilson TW. Neurophysiological abnormalities in the sensorimotor cortices during the motor planning and movement execution stages of children with cerebral palsy. *Developmental Medicine and Child Neurology* 2014;56(11):1072-7
- Lehnert-Schroth C. *Three Dimensional Treatment for Scoliosis: a physiotherapeutic method for deformities of the spine* (1st edn). California, Martindale Press 2007
- Massey M. Chest development as a component of normal motor development: implications for pediatric therapists. *Pediatric Physical Therapy* 1991;3(1):3-8
- Matthews M, Blandford S, Marsden J, Freeman J. The use of dynamic elastomeric fabric orthoses suits as an orthotic intervention in the management of children with neuropathic onset scoliosis: a retrospective audit of clinical case notes. *Scoliosis and Spinal Disorders* 2016;11:14:1-10
- Matthews M, Crawford R. The use of dynamic Lycra orthosis in the treatment of scoliosis. A treatment case study. *International Society of Prosthetics and Orthotics* 2006;30(2):174-81
- Mutsaerts MS, Steenberg B, Bekkering H. Anticipatory planning deficits and task control effects in hemiparetic cerebral palsy. *Experimental Brain Research* 2006;172:151-62
- Negrini S, Aulisa AG, Aulisa L, Circo AB, DeMauroy JC, Durmala J, Grivas T, Knott P, Kotwicki T, Maruyama T, Minozzi S, O'Brien JP, Papadopoulos D, Rigo M, Rivard C, Romano M, Wynne JH, Villagrasa M, Weiss HR, Zaina R. 2011 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. *Scoliosis and Spinal Disorders* 2012;7(3):1-35.
- Pin T, Dyke P, Chan M. The effectiveness of passive stretching in children with cerebral palsy. *Developmental Medicine and Child Neurology* 2006;48:855-62
- Riise RB, Brox JL, Sorersen R, Skjeldal OH. Spinal deformity and disability in patients with Rett syndrome. *Developmental Medicine and Child Neurology* 2011;53(7):653-7.
- Sawle LF, Freeman J, Marsden J, Matthews M. *A pilot study investigating the effect of a dynamic orthosis upon athletic groin pain*. World Federation of Athletic Therapy and Training, Dublin City University, 4-6 September 2014
- Stokes IB, Geoffrey RG, Dangerfield PH. Biomechanical spinal growth modulation and progressive adolescent scoliosis – a test of the “vicious cycle” pathogenetic hypothesis: summary of an electronic focus group debate of the International Federation of Scoliosis Etiology (IBSE). *Scoliosis* 2006;1(16):1-21
- Tsirikos AI. Development and treatment of spinal deformity in patients with cerebral palsy. *Indian Journal of Orthopaedics* 2010;44(2):148-58
- van Elk MC, Crajé C, Beeren MEGV, Steenberg B, van Schie HT, Bekkering H. Neural evidence for impaired action selection in right hemiparetic cerebral palsy. *Brain Research* 2010;1349:56-67
- Vialle R, Thevenin-Lemoine C, Mary P. Neuromuscular Scoliosis. *Orthopaedics & Traumatology: Surgery & Research* 2013;99S:S124-S39
- Weinstein SL, Dolan LA, Wright JG, Dobbs MB. Effects of bracing in adolescents with idiopathic scoliosis. *New England Journal of Medicine* 2013;369:1512-21
- Zaborowska-Sapeta KK, Kowalski I, Kotwicki T, Protasiewicz-Faldowska H, Kiebzak W. Effectiveness of Cheneau brace treatment for idiopathic scoliosis: prospective study in 79 patients followed to skeletal maturity *Scoliosis* 2011;6(2):1-5 ❌



Advertisers... let us help you reach our Physio First members



5 reasons to advertise with *In Touch*

1

We are the only journal aimed specifically at private physiotherapists

2

Our highly credible content is written by true experts in the field of private physiotherapy

3

90% of our readers are business owners. They are the primary decision makers in their business

4

Our publication is available in print and online, allowing your brand to reach more people

5

Competitive advertising rates – we offer a range of advertising packages to suit all budgets

Who does *In Touch* reach?

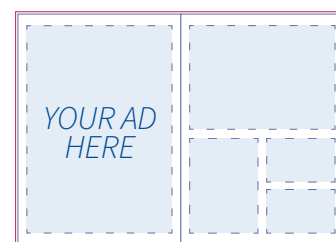
- All members of Physio First, comprising more than 3,000 private physiotherapists
- Journal subscribers
- Members of the Irish association for Chartered Physiotherapists in Private Practice (CPPP)
- Associates and colleagues of our members – more than 48% of our members are practice owners working with other private physiotherapists
- An age range of 20–80 years old, based throughout the UK

FIND OUT MORE

We have a range of display sizes and packages to suit all advertising budgets, starting from as little as £70.

For more information and to view our online media pack, go to:

www.physiofirst.org.uk/resources/in-touch.html



Physiotherapeutic scoliosis-specific exercise (PSSE) treatments for adults after discharge: self-perceived results

AMY SBIHLI MPT DPT

Schroth Certified Clinician and SBI Instructor

The adult scoliosis patient population is seeking treatment to reduce pain, improve function and quality of life. In the majority of cases scoliosis is not the primary problem related to the source of the pain complaint. However, the scoliosis does tend to be the focus of both the patient and the medical provider when embarking on a treatment path.



LEARNING OUTCOMES

- 1 Understand the ongoing use of PSSE home exercises after treatment is complete.
- 2 Be aware of the reports of improved quality of life after discharge from PT using PSSE.
- 3 Understand the benefits of small doses of PSSE to the patient.

Introduction

The scoliosis literature over the last 40-50 years has been aimed at the radiological and clinical factors that lead to scoliosis pain. The outcomes of these studies have mixed results. It seems that we can at best say that pain is multi-factorial in cause, and it is up to the medical community to assess both radiological and clinical findings to find the source of the pain in each individual case (Rigo 2010).

In 2009, Bess *et al* found that no matter the age, co-morbidity or sagittal imbalance of the patient, surgical intervention was the most recommended treatment in the management of scoliosis (Bess *et al* 2009).

Lowe *et al* (2006), together with the Scoliosis Research Society, defined adult scoliosis into three main categories:

- A. Adult onset or De Novo: degenerative changes later in life (disc or facet OA)
- B. Adolescent Idiopathic Scoliosis: curvature is stable or progressing (combined with disc, facet or endplate degeneration and / or trunk imbalance)
- C. Secondary scoliosis: influences to the spine from parallel diagnoses origin such as neuro-muscular or congenital.

The most recent research on the impact of physical therapy on adults with scoliosis has been grim. Everett (2007) looked at conservative treatment outcomes for patients with adult scoliosis and degenerative scoliosis. The treatments reviewed were bracing, casting, physiotherapy, chiropractic and injections. His main conclusion was that there is low evidence for any non-operative treatment option for adult degenerative scoliosis (Everett 2007).

Bridwell *et al* (2009) published similar results when they studied the question of whether non-operative and operative treatments improved the two-year quality of life in patients with adult symptomatic lumbar scoliosis. One conclusion of this study was that operative patients outperformed non-operative patients by all measures (Bridwell *et al* 2009).

A 2010 adult scoliosis post-op literature review, which excluded any study with patients under 18 years old or with a

follow-up period of less than two years, concluded that surgery for adult scoliosis is associated with improvement in radiographic and clinical outcomes at a minimum two-year follow-up. However, the conclusion goes on to report that some outcomes were better than others and that perioperative morbidity includes an approximately 13% risk of pseudarthrosis and a greater than 40% incidence of perioperative adverse events. Incidence of perioperative complications were substantial and need to be considered when deciding optimal disease management (Yadla *et al* 2010).

Prior to this, Asher and Burton had reported that patients who were operated on not only faced the usual risks associated with major surgery, but that there was a 6% to 29% chance of an individual requiring re-operation, and the remote possibility of developing a pain management problem (Asher & Burton 2006). Other studies have outcomes with post-surgical progressive degenerative changes, sagittal plane imbalances, unchanged rib deformities and reduced quality of life (Kumar *et al* 2001; Danielsson *et al* 2001; Bridwell *et al* 2002; Weiss & Goodall 2008; Benli *et al* 1996; Kim *et al* 2008; Delorme *et al* 2001).

With results like these, where is this patient population to turn for improved pain control, function and quality of life? The research for adult treatment,

"THE RESEARCH FOR ADULT TREATMENT, CONSERVATIVE OR NON-CONSERVATIVE IS NEITHER RANDOMISED NOR DOES IT CONTAIN STRONG EVIDENCE"

conservative or non-conservative, is neither randomised nor does it contain strong evidence. Some adults with scoliosis don't want to elect for the surgery option even if it is recommended. This is the inspiration for asking questions about physiotherapy. What is it about the adult scoliosis population that isn't responding to traditional physiotherapy techniques? If the results of medical testing reports that scoliosis is not the cause of pain, why isn't the research on outcomes from physiotherapy treatment on adult scoliosis showing the same results as those for the treatment of the non-scoliotic adult with low back pain or dysfunction (Cherkin *et al* 1998)? Could it be that the type of treatment that consistently works for a symmetrical spine does not work for an asymmetrical spine? Could physiotherapeutic scoliosis specific exercise (PSSE), which is traditionally used for adolescent idiopathic scoliosis, be modified and supportive to the adult scoliosis population?

A pilot study, created by this author, observed the response of adults who were treated with the Schroth Method, a physiotherapeutic scoliosis specific exercise. The general definition of PSSE is given by the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) as follows (Negrini *et al* 2012):

- Auto-correction in three dimensions (3D)
- Training in activities of daily living (ADL)
- Stabilising the corrected posture
- Patient education.

The stated basic objectives of PSSE are (Negrini *et al* 2012):

- To stop curve progression at puberty (or possibly even reduce it)
- To prevent or treat respiratory dysfunction
- To improve aesthetics via postural correction
- To prevent or treat spinal pain syndromes.

Berdishevsky *et al* (2016) provides an in-depth descriptive review of each type of PSSE. It also includes information on conjunctive treatment management such as bracing and manual techniques. Lastly, it lists some scientific evidence for these techniques. In their review, the authors state recognition that the Schroth Method in particular is among the most studied and widely used of the PSSE approaches (Berdishevsky *et al* 2016).

However, the focus of Berdishevsky's research on the use of PSSE was mainly for children, so owing to the lack of research on PSSE for adults with scoliosis, the purpose of our own pilot study was to assess how adults perceive their use of PSSE during and after treatment from outpatient physiotherapy as it relates to their pain, function and quality of life.

A 10-question internet survey was created by this author to assess each patient's current age, age at diagnosis, number of visits for treatment, information about their specific home programme, compliance with home

exercise and the patient's perceptions of the treatment results. This survey was sent to all (n=52) patients who showed radiologic findings. Each one had already been seen at one clinic by the same physical therapist trained and certified in PSSE-Schroth Method.

Treatment recommendations were 10 visits with a frequency of once a week for seven weeks, with a follow-up of once a month for two to three months. Each session lasted one hour with a patient to therapist ratio of 1:1. The treatment sessions included education on curve anatomy, postural balance, self-elongation, joint protection strategies, pacing and modified 3D curve-specific spinal stabilisation exercise (Schroth Method). Compliance expectations were 10-20 minutes daily during active treatment and a minimum of 20 minutes three times a week after discharge.

Over the next 13 weeks a clinic aide sent the patients three reminder emails regarding the completion of the survey. The author of the study was blinded from the names of the returned surveys.

The survey return rate was 55.8%. Of the returned surveys, the patient demographic was 90% female. The age range was 18-77 with the largest age group represented (28%) at 55-65 years ▶

"OUR PILOT STUDY WAS TO ASSESS HOW ADULTS PERCEIVE THEIR USE OF PSSE DURING AND AFTER PHYSIOTHERAPY TREATMENT"

“ 30% OF RESPONDENTS REPORTED THAT FINDING TIME WAS THE LARGEST BARRIER TO COMPLIANCE ”

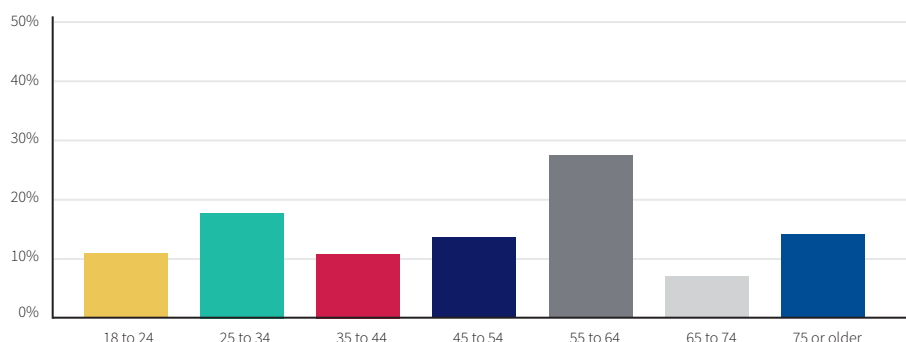


FIGURE 1: Current age range of responders

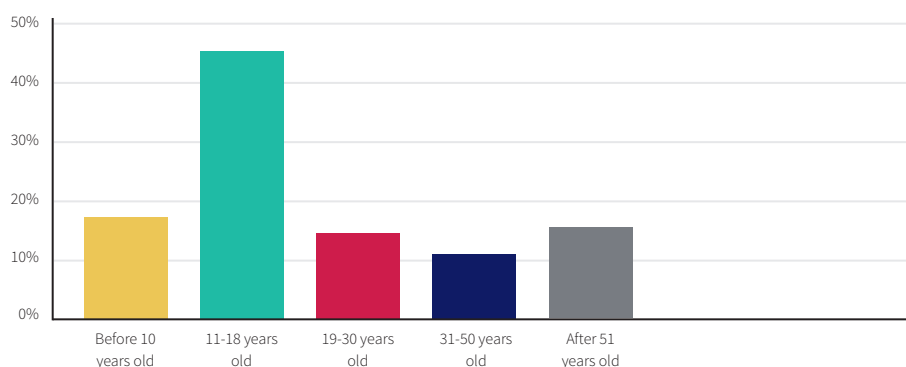


FIGURE 2: Age at which responders were diagnosed with scoliosis

old (figure 1). The population largely contained patients that were diagnosed with scoliosis as an adolescent (figure 2).

The reported frequency of performing the home exercises (figure 3) showed that 27% did so three to four times a week and another 27% exercised more than five times a week. The remaining 44% reported exercising only once or twice a week. The home programme

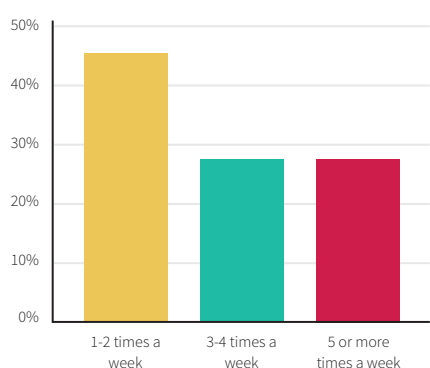


FIGURE 3: Frequency per week of performance of home exercises

duration (figure 4) varied from 11-20 minutes for 39% to 5-10 minutes for 44%. Of those responding, 40% felt compliant, while 30% reported that “finding time” was the largest barrier to compliance.

With regard to the current status of quality of life, none of the respondents reported a negative impact. One patient reported no change, while the combined total of 22 patients reporting

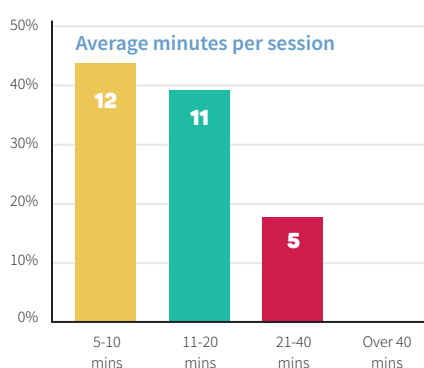


FIGURE 4: Time spent on each exercise session

significantly, or moderately positive improvement, gave a result of 85% improved quality of life.

The last question asked patients to rank from one to ten the treatment outcomes which they felt had had the most impact. The list of treatment outcomes were: posture control, less pain, breathing, function, mental wellbeing, physical appearance (figure 5). This same data was read from a per patient response to find which domain was chosen as the most important outcome for each patient.

The results showed that, per patient, the number one issue that each felt the treatment had impacted on was:

- 10 stated posture control
- 5 stated pain control
- 5 stated breathing mechanics
- 3 stated mental wellbeing
- 3 stated function
- 1 stated appearance.

I would like to acknowledge here that there may have been a responder bias as it was not deliberately explained to the surveyed patients that the author was blinded to their responses. Also, with 23 non-responders, it is possible that some had a poorer outcome and / or poorer compliance.

The data collected suggests that, in the conservative management of adults with scoliosis seeking conservative care, those that learn PSSE are continuing to use the exercise and training after discharge. Additionally, PSSE completed in small doses after discharge seems to have some positive effects in adults with scoliosis especially on perceived posture control, pain and breathing.

Conclusion

Further research is needed in order to establish the case and improve ongoing,

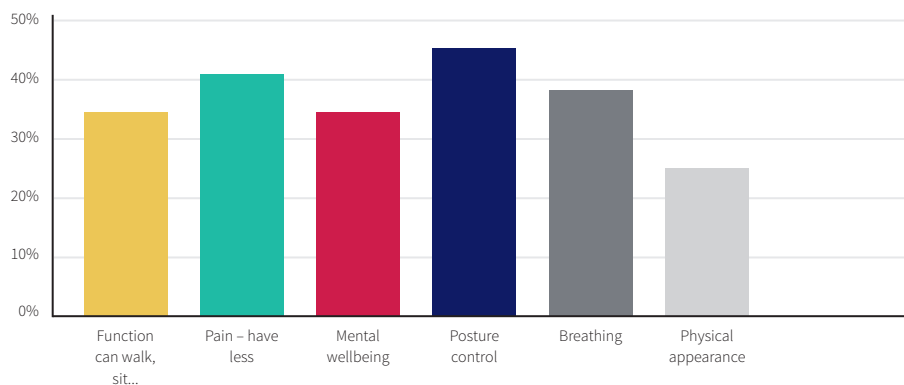


FIGURE 5: Impact of treatment modality by rank order

successful physiotherapeutic treatment of the adult scoliosis population. Areas of development to be considered are in the creation of the ideal frequency and duration of treatment, or in specific exercise dosages. It is also important to find ways to measure compliance tracking and introduce accountability motivators as these are important factors in the treatment outcomes. There is a need for a randomised controlled trial to assess the effects of PSSE on this population of patients who, despite the large number of conservative management options offered to them, are frequently met with limited success for improved quality of life, pain management or function.

About the author

Amy Sbihli is the Director of Scoliosis Services at Orthopaedics Plus in the Boston area. She began working with outpatient orthopaedic spine and scoliosis patients in 2004. Amy is certified to practice and teach the Schroth Method through the Barcelona Scoliosis Physical Therapy School (BSPTS) where, in 2005, she was awarded her certification by Dr Manuel Rigo.

Amy received master's and doctorate degrees in physical therapy from Washington University in St Louis. She also holds a BA in Kinesiology from the University of Michigan. Treatment expertise includes scoliosis, SI, orthopaedic spine, movement dysfunction and Pilates.

CONTACT DETAILS

asbihli@spineacademypt.com

References

- Asher M, Burton D. Adolescent idiopathic scoliosis: natural history and long term treatment effects. *Scoliosis* 2006;1(1):2
- Benli IT, Tüzüner M, Akalin S, Kiş M, Aydin E, Tanoğan R. Spinal imbalance and decompensation problems in patients treated with cortel-dubousset instrumentation. *European Spine* 1996;5(6):380-6
- Berdishevsky H, Lebel VA, Bettany-Saltikov J, Rigo M, Lebel A, Hennes A, Romano M, Bialek M, M'hango A, Betts T, de Mauroy JC, Durmala J. Physiotherapy scoliosis-specific exercises – a comprehensive review of seven major schools. *Scoliosis and Spinal Disorders* 2016;11:20
- Bess S, Boachie-Adiei O, Burton D, Cunningham M, Shaffrey C, Shelokov A, Hostin R, Schwab F, Wood K, Akbarnia B. Pain and disability determine treatment modality for older patients with adult scoliosis, while deformity guides treatment for younger patients. *Spine* 2009;34(20):2186-90
- Bridwell KH, Glassman S, Horton W, Shaffrey C, Schwab F, Zebala LP, Lenke LG, Hilton JF, Shainline M, Baldus C, Wootten D. Does treatment (nonoperative and operative) improve the two year quality of life in patients with adult symptomatic lumbar scoliosis: a prospective multicenter evidence-based medicine study. *Spine* 2009;34(20):2171-8
- Bridwell KH, Hanson DS, Rhee JM, Lenke LG, Baldus C, Blanke K. Correction of thoracic idiopathic adolescent scoliosis with segmental hooks, rods, Wisconsin wires posteriorly: it's bad and obsolete, correct? *Spine* 2002;27(18):2059-2066
- Cherkin DC, Deyo RA, Battié M, Street J, Barlow W. A comparison of physical therapy, chiropractic manipulation and provision of an educational booklet for the treatment of patients with low back pain. *New England Journal of Medicine* 1998;339(15):1021-9
- Danielsson AJ, Cederlund CG, Ekholm S, Nachemson AL. The prevalence of disc aging and back pain after fusion extending into the lower lumbar spine: a matched MR study twenty-five years after surgery for adolescent idiopathic scoliosis. *Acta Radiologica* 2001;42(2):187-197
- Delorme S, Violas P, Dansereau J, de Guise J, Aubin CE, Labelle H. Preoperative and early postoperative three-dimensional changes of the ribcage after posterior instrumentation in adolescent idiopathic scoliosis. *European Spine* 2001;10(2):101-7
- Everett C. Evidence based medicine summary statement. *Spine* 2007;32(19):S130-S134
- Kim YJ, Bridwell KH, Lenke LG, Glattes CR, Rhim S, Cheh G. Proximal junctional kyphosis in adult spinal deformity after segmental posterior spinal instrumentation and fusion: minimum five-year follow-up. *Spine* 2008;33(20):2179-84
- Kumar MN, Baklanov A, Chopin D. Correlation Between Sagittal Plane Changes And Adjacent Segment Degeneration Following Lumbar Spine Fusion. *European Spine* 2001;10(4):314-9
- Lowe T, Berven SH, Schwab FJ, Bridwell KH. The SRS classification for adult spine deformity: building on the King/Moe and Lenke classification systems. *Spine* 2006;31(19):S119-25
- Negrini S, Aulisa A, Aulisa L, Circo AB, de Mauroy JC, Durmala J, Grivas TB, Knott P, Kotwicki T, Maruyama T, Minozzi S, O'Brien JP, Papadopoulos D, Rigo M, Rivard CH, Romano M, Wynne JH, Villagrasa M, Wiess HR, Zaina F. 2011 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. *Scoliosis* 2012;7:3
- Rigo M. Differential diagnosis of back pain in adult scoliosis: non-operative. *Scoliosis* 2010;5(S1):044
- Weiss HR, Goodall D. Rate of Complication in Scoliosis Surgery – a Systematic Review of the Pub Med Literature. *Scoliosis* 2008;3:9
- Yadla S, Maltenfotr MG, Ratliff JK, Harrop JS. Adult scoliosis surgery outcomes: a systematic review. *Neurosurgical Focus* 2010;28(3):E3

Scoliosis: a patient's perspective

BERNADETTE JOHNSON

With introduction by **PAUL JOHNSON** MSc BSc MMACP MCSP Editor of *In Touch*



This is a personal account by an amazingly brave lady. Bernadette has been coming to see me at The Physio Therapy Centre for many years and I remember her first visit. Full of fear of the unknown and wondering if this physio would be any better than the others. Would he be able to help her as she struggled with the burden that never goes away, however much she wishes it would?

She told me once about how she would lie on the bathroom floor for hours, with its under-floor heating as it was one of the only places she ever got relief. That was until the bill dropped through the door and she thought there may be cheaper ways to help her pain. Sometimes it's not been as easy as we would have liked, as the pain once more overpowered this strong and determined woman, and there are still times when it can all become too much for her but, amazingly, Bernadette pushes through.

It is a privilege, as a physio, to have been there to help her as much as I could and, in return, Bernadette has taught me so much about this debilitating condition that is called Idiopathic Scoliosis. As with many such conditions, it is one that is tough to live with. Yet the option of surgery is so often a "shall I / shan't I?" ping pong match in her head. Should she have the operation that may, or may not, arrest the curves and help the pain, but that also comes with the "there are no guarantees of success" and "loss of mobility" provisos always hanging in the air, or should she carry on as she has been, for as long as possible, with physio attempting to relieve the pain and keep her going? A decision that is so difficult that it puts Bernadette, and all patients like her, between a rock and a hard place.

Our aim, with Bernadette's help and permission, is to highlight the issues from the patient's perspective. Her account will give us, as physiotherapists, a greater understanding of this much misunderstood condition and encourage us to become better informed not only about what we can do to become better carers to those who have to live with their pain on a daily basis, but also to give us the tools towards the path we will have to travel to become Physio First **Quality Assured Practitioners**.

My story

I first found out that I had scoliosis in my early 30s. My first child had been born six weeks earlier and I was at a postnatal exercise class run by a private physiotherapist (ironically), who rather publicly asked me if I knew that I lay on the floor like a banana. At the end of the class she had a closer look at my back and suggested that I see my GP who, subsequently, diagnosed scoliosis and referred me to an orthopaedic surgeon at the Sussex County Hospital.

It could be concluded from the route by which I discovered my scoliosis that it had not previously caused me any problems – not so.

I was one of four children and my parents were very keen on academic success. Fortunately, we were a healthy bunch by and large and any bone pains were

diagnosed as "growing pains", and internal pain as "probably wind". My mother was a great believer in "letting nature take its course" when it came to illness, and for cuts and bruises her main remedy was "spittle"! It wasn't neglect, more an approach to health that was typical of the time and I would have been aware that it probably wasn't worth mentioning any physical issues that worried me. I do vaguely remember a school nurse, but I never had a medical after the age of eight. I was tall for my age and very skinny. I assume that I had a quite significant growth spurt because at 12 years old I was a 5'8" tall. During puberty, I was more concerned with my non-existent breasts than my height. There were specifics that bothered me, though. The heel of one shoe was always significantly worn down more quickly than the other. To stand comfortably I always flopped on one hip, my pelvis protruded, and the

top of my back hurt. My father was always telling me not to slouch, but I thought he was just being a typical parent.

I went to a convent grammar school where the emphasis was on academic, rather than sporting success. I should, however, have been good at sports; I was tall and had the intelligence to understand the tactics of a team sport. However, I was dropped from the netball team because I was not a "mover" and I consoled myself that academia was better anyway. I was frustrated that I could not do PE well. I couldn't understand why even the "fat girls" (no political correctness in my day) could vault, but I couldn't get my legs wide enough and I was too embarrassed to ask why. Running was the worst. Even after only 50 yards of a cross-country run I would experience intense pain in my shins and spine. As everyone except me

"THE HEEL OF ONE SHOE WAS ALWAYS WORN DOWN MORE QUICKLY THAN THE OTHER AND TO STAND COMFORTABLY I ALWAYS FLOPPED ON ONE HIP"

could run fairly decently for a couple of miles at least, people just thought I was lazy and unfit, I thought so, too.

At 16 it was common to escape from school to go sunbathing, something I could not do without pain. It was like lying on two sticking out sore bits in my back. I even remember proudly letting my friends trace my spine, showing how it appeared to be right up against my right shoulder blade. It never occurred to me to mention this to any adult, even though it worried me, and I ached if I stood for any length of time. I started to avoid things that hurt and so I became a bit of a loner, despite being popular.

INITIAL CONSULTATION

When I was first referred to the Sussex County Hospital I was bewildered and postnatally tired. My son was a big baby and I suffered with bad back pain, but everyone said that pregnancy causes backache, so I just put up with it. The hospital doctor, who was not a consultant, informed me that I had a 48 degree curve in my spine, but I was fully grown so basically to "go away". It was the first time I heard the statement that "scoliosis doesn't hurt", which annoys me so much even now. I was asked if I would mind having another x-ray taken for the consultant's scrapbook. I asked no further questions and was given no further information.

During that time I did quite a bit of keep fit and, in my head, compensated for my lack of flexibility with the fact that, if there was something I couldn't do I need not to worry too much as I didn't need to lose weight. I always stood at the back of the class though, and wished I could do the forward stretches and running on the spot exercises; all painful and impossible tasks.

I was referred for physiotherapy where I was told never to carry my baby as it would exacerbate the curve. My second

child was nine weeks old at the time, so that was practical advice! The physiotherapist also seemed irritated that I could not stand straight and I didn't like standing in my underwear being spoken to as if the condition was my own fault. She put me in traction and left me on my own for 20 minutes. I was embarrassed and upset. I did not go again.

SECOND CONSULTATION

Three years later my back was causing me intense problems with pain and movement that I could no longer ignore. My GP was great, and because I had private medical insurance he referred me to Michael Edgar in Harley Street who, although I did not know at the time, was the foremost scoliosis expert in England. He is now retired but still sits on advisory bodies such as the Scoliosis Research Society (SRS) and the UK Scoliosis Association (SAUK).

I had full x-rays taken while standing; the correct way to assess a curve, rather than lying down as were taken in Sussex. I discovered that I had a progressive curve of 55 degree thoracic **and** 35 degree lumbar (where had that one come from?). He said that the evidence suggested that my curves would progress owing to gravity, if not idiopathically, by at least 1 degree per year. Mr Edgar wanted to fuse my spine from T6-T12 and advised that, without it, I was likely to end up in a wheelchair.

Well, what did he know, I thought! I had two children and a husband who worked in London, my parents were advising not to let anyone operate on a grown spine, and I could not be out of action with back surgery. So, I carried on with my keep fit and lifestyle, determined to prove that I did not need surgery. My GP took me to the medical library at my local hospital where we looked up scoliosis. He agreed to send me for x-rays every six months to measure the progress of the curve. He was sceptical about surgery too!

I never mentioned scoliosis to my friends and family and I put it to the back of my mind as much as I could. Without realising it I became exemplary at cognitive behaviour techniques (CBT). I kept busy working as an IT consultant and an active fund-raiser for the church and school. I dealt with the pain alone. The radiography department at the hospital were difficult about the regular x-rays requested by my GP and so, after a while I stopped having them.

I got worse at the keep fit exercises, growing more and more frustrated and embarrassed at my very limited flexibility. It was the age of aerobics performed by very glamorous ladies in Jane Fonda leotards and full makeup. I was in a baggy t-shirt, red-faced and deformed. I had a rib hump and excessively broad shoulders. I would dread the instructor's shout of "last bit of effort", seemingly directed at me. Some exercises simply hurt too much, so I stopped going.

I was aware that I was neglecting my back. This was a time of self-destructive mindfulness.

Then, one day, I could not get out of bed; I could not move. Eventually, and in testament to the recommendation to keep moving, the pain did ease off, but came back significantly. My GP recommended physiotherapy. I asked about an osteopath or a chiropractor instead. He just repeated "have physio" and suggested a local practice he went to himself. I remembered my last experience and dreaded going. 🚫

"WITHOUT SURGERY TO FUSE MY SPINE I WAS LIKELY TO END UP IN A WHEELCHAIR"

“MY PHYSIO HAS TAUGHT ME A HUGE AMOUNT ABOUT COPING WITH PAIN AND WE HAVE DEVELOPED A THERAPY WHICH HELPS ME”

I made a physio appointment. I was distraught with pain and my inability to cope. I was terrified about what might be going on and about making it worse, and was shy and embarrassed about showing my back to anyone. I desperately needed help and must have been a difficult patient! My physio, Paul Johnson, was very kind and patient with me. He has taught me a huge amount about coping with pain and over time we have developed therapy which helps me. I will always be grateful and I continue to visit him often.

DEVELOPMENT OF A THIRD CURVE

After a while, my physio wrote to my GP surgery with an update. It had been 15 years since I had seen Michael Edgar and I was smug that I wasn't in a wheelchair, but I was often in a great deal of pain. My GP had retired, Mr Edgar had retired and I was referred privately to his successor who told me that I now had three curves; the extra one was cervico-thoracic. Any surgery would now be from T1 to S1, such a huge fusion that, owing to the potential complications, he did not think I needed “yet”. Because my spine was too compromised it was not possible to address my stenosis, or disk failure individually by surgery (figure 1). Instead, injections, physiotherapy and medication were all suggested.

As you can imagine, I had become quite an expert on scoliosis.

I have a progressive adult idiopathic structural scoliosis and for the purposes of the rest of this article it is with this condition in mind that I mostly make my comments.

Types of scoliosis

Scoliosis can be structural or functional. Functional scoliosis, also known as “non-functional”, involves a temporary change of spinal curvature caused

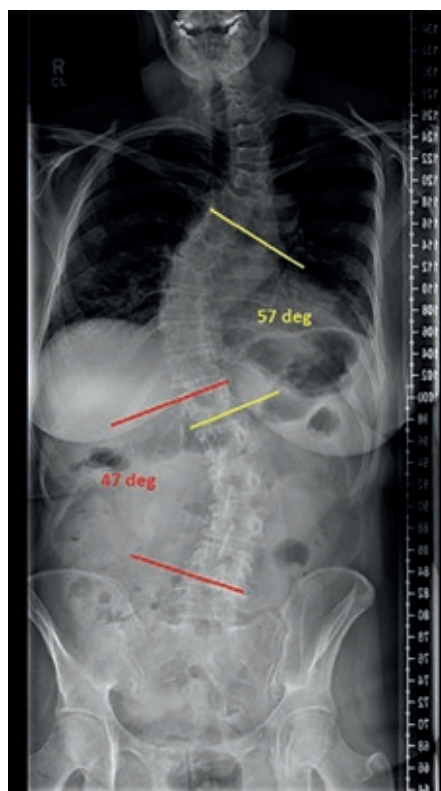


FIGURE 1: X-ray indicating thoracic curve at 57 degrees, and lumbar curve at 47 degrees

by an underlying condition such as different leg lengths, muscle spasms, or an inflammatory condition that may produce muscle spasm, e.g. appendicitis. By treating the underlying cause rather than the spine itself, functional scoliosis can be corrected. With structural scoliosis there is a fixed curve of the bones of the spine.

Structural scoliosis is sub-divided as follows:

- Congenital – born with wedged, half-formed vertebrae
- Neuromuscular – resulting directly from an underlying neurological condition such as Down's Syndrome
- Infantile
- Juvenile
- Adolescent
- Adult.

The last four categories indicate the time during which the condition develops

and are usually referred to as being Idiopathic, indicating that the cause of the condition is unknown.

Adult scoliosis is further sub-classified as de Novo, meaning as a result of degenerative changes during the aging period, the effect of which is usually a lumbar curvature. Scoliosis that originally occurred during adolescence, and progressed or degenerated during adulthood, i.e. after the spine has fully grown, is known as adult adolescent idiopathic scoliosis, or adult AIS. It is important to recognise that the adult AIS can progress as a result of the original idiopathy and not necessarily as a result of degeneration; it can be significantly different from adult degenerative, or de Novo scoliosis in that there may well be more than one curve (double or triple major), and an accompanying rib-hump deformity caused by associated rotation. Recognising the difference is also important, not only because of the rate of likely progression, but also to recognise that sufferers of adult AIS may have already experienced years of pain and psychological issues to do with deformity.

In my less charitable moments I think that the pain from de Novo scoliosis cannot be as bad as adult AIS because it has not been present for any length of time, but this is obviously nonsense.

The treatment path for AIS is either “watch and wait”, or fusion surgery. Not all curves progress, the current statistics show that between 4%-6% of adolescents will develop AIS and, of those, only 10% will ever need to consider surgery. Watch and wait can also involve bracing with the aim of halting the progression of the curvature sufficiently to avoid surgery. Typically a curve that reaches over 50 degrees during adolescence will be recommended for fusion surgery or one of the newer, less invasive surgeries such as vertebral tethering (VBT) or vertebral stapling (VBS). The lucky ones, depending on how you look at it, who do not progress to surgical levels, will remain with sometimes quite severe painful scoliosis and no obvious treatment path.

Determining a treatment path

Once a scoliotic is skeletally mature the treatment path is, in my opinion, pretty woeful. I am shocked to find that it is actually hardly any different now than it was for me more than 20 years ago. If you are able to get past the GP, referral to an orthopaedic consultant will often **still**, even in this internet age, result in being told that:

- a)** scoliosis doesn't hurt
- b)** nothing can be done once you are fully grown
- c)** it won't get any worse.

There is no excuse for such ignorance and poor information. The current approach to not offer x-rays for back pain isn't helping scoliosis patients as an x-ray is absolutely necessary to the diagnosis of scoliosis (www.thephysiotherapysite.co.uk/physiotherapy/back-pain/investigations). The few who push or, like me, have an enlightened GP, or access to private medicine will know that a referral to a scoliosis specialist is the next step. The Royal National Orthopaedic Hospital, where Michael Edgar practiced in the NHS, has a spinal deformity unit. SAUK is a UK charity that offers support for patients and GPs about this. However, it is still astonishing how many people are denied this information, despite the burgeoning forums on social media and the Facebook groups that are filled with the same complaint from patients about the lack of diagnosis for their pain.

Dealing with pain

Let me describe my pain. It is like a dagger splitting the vertebrae in my thoracic spine at the apex of the curve (I have a mirror neurone of a dagger in my brain), a constricting pain in my ribs and debilitating pain in my lumbar spine. All this is combined with significant pain in my legs and neck. I am unable to hold a posture for any length of time, but changing posture does not provide relief. I cannot sit in a theatre, eat at a restaurant, sleep, walk, or do any daily activity without pain. The pain never goes away; at best it recedes but not

"I AM SHOCKED TO FIND THAT TREATMENT FOR THE SKELETALLY MATURE SCOLIOTIC IS HARDLY ANY DIFFERENT NOW THAN IT WAS 20 YEARS AGO"

in any controlled way that I can take advantage of. I get constant muscle spasms in my chest. I take Tramadol, I am unable to take Ibuprofen and I have formal CBT sessions.

The two things that really help, although both hurt a lot, is a massage followed closely by intense manipulative therapy which I have with a physiotherapist.

I am lucky; if I were reliant on the NHS I would be offered nothing but NSAIDs and anti-depressants but, because I work, I can pay for private treatment which is cost effective – just – in that it allows me a certain quality of life. I do, however, constantly worry about what is happening to my curves.

Scoliosis sufferers have limited access to any informed healthcare professionals. If you do find a consultant who specialises in scoliosis, appointments are infrequent and conversation pivots around surgical options. A conventional orthopaedic surgeon – and the advice from SAUK is don't see one – might suggest a short-term repair, leading you down an endless path of more and more surgery as your spine inevitably collapses from the interference.

Treatment paths are a minefield to negotiate. I have had to find everything out for myself. I don't know of any other medical condition where the patient will have more knowledge about it than most professionals and, therefore, have no-one to discuss it with meaningfully and, moreover accurately, one day to the next.

Counselling

I was referred for counselling because of my "mood". It seems that it is OK to talk to a non-specific counsellor on the NHS budget, but not to have access to

a musculoskeletal expert. Counsellors encourage patients to get support from family and friends but, as they don't understand the condition, they often think that there "surely must be something the doctor can do" and, in some cases they consider that you, the patient, are to blame for not undergoing surgery, even when consultants are not actually recommending it, or that the surgery route may well lead to a different set of problems / pain.

Also, friends will always know someone who has had their scoliosis sorted by a chiropractor or an acupuncturist who you must visit and there will be countless people who have had a back problem "fixed".

So discussing your condition with family and friends is too stressful, you can end up blaming yourself for not getting better, frustrated by those who treat backache as a fashion accessory and, yes, be jealous of those who have received successful treatment for a prolapsed disc or stenosis.

The scoliotic is on their own and alone, and quite frankly it is not good enough. 🚫

"IF I WERE RELIANT ON THE NHS I WOULD BE OFFERED NOTHING BUT NSAIDS AND ANTI-DEPRESSANTS"

“THERE IS NO EVIDENCE THAT PHYSIOTHERAPY CAN HELP SCOLIOSIS, SO THERE IS LITTLE TRAINING FOR PHYSIOTHERAPISTS FOCUSED ON SCOLIOSIS”

Conservative treatment

If the surgical path for a scoliotic is poor, the conservative path is pretty well non-existent.

A vacuum exists that is being readily filled by many of those who offer therapy options outside of conventional medicine who are happy to take your money and will confidently tell you that they can cure your scoliosis. A claim it is difficult to dispute if they have indeed had a patient with, for example, a functional scoliosis that did not cause any particular problem and who has gone away from their treatment happy. At best the practitioner is naïve and, at worst, uninformed. I have given up trying to explain to some who claim to “treat scoliosis” that they are merely treating a patient who happens to have scoliosis. It is not sophistry or semantics, just ignorance on their part.

PAIN SCIENCE

As part of my treatment my physiotherapist has introduced me to pain science (*In Touch* 2015) which, on an abstract level, is fascinating, but I find it difficult to remember its principles when I am crying in pain. Inevitably, I am drawn more to an article addressing medical disciples of pain science that says: “**Ignoring biological aspects of our patients’ complaints is evidence-based silliness. Calls to abandon a biomedical model is evidence-based moronity and downright dangerous. Psycho-social dimensions are of critical importance to our reasoning and management**” (Kerry 2014).

Although I am intellectually proud to study pain science, I find it hard to allow it to help me. It seems to exist in its own world; spoken about by an enlightened few, while the majority of physicians behave as if they have no knowledge,

and can actually be hostile when you try to contribute to managing your own pain.

CHIROPRACTIC TREATMENT

While I, personally, don’t have much time for chiropractors, they are not at all surprised or resistant when it comes to treating scoliosis patients.

A group of “specialised” US-based chiropractors purport to be able to reduce scoliosis curves and prevent them from reaching surgical levels. However, they support this by referring to outdated studies on fusion patients, and their treatment includes a bone formula for the curves, specific scoliosis pain relief medication and a two-week boot camp for exercise-based therapy, all of which are expensive. There seems to be no evidence, other than the before and after x-rays that show superficial reduction, which could be achieved by careful positioning, that any of their treatment works and their “research” is reviewed only from within their organisation.

Chiropractic treatment is also not recommended by the Setting Scoliosis Straight Foundation, formerly the Harms Study group; a not-for-profit US organisation that was established in 2008 to support and advance techniques in the treatment of spinal deformities in children and adolescents.

One thing I do appreciate about chiropractors is their belief that there does need to be a better way to treat scoliosis, even if this is not always evident in the methods they use.

PHYSIOTHERAPY

In the UK, I want to rely on the physiotherapy model. I am respectful of the fact that it is the only complementary

musculoskeletal body, trained within NHS guidelines. I assumed that the physiotherapist would be equipped to offer treatment; keen to look at new treatments and to put new treatment ahead of profit. I look to the physio profession for the help we need.

However, it seems to me that little training for physiotherapists focuses on scoliosis. Physios, as I understand it, say their treatment has to be evidence based and there is no evidence that physio can specifically help a scoliosis. So there’s the rub. You have to look carefully for research done on scoliosis exercise-based pain relief. I believe this is not helped by the complexity of the definition. In 2005 the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) consensus paper concluded that “priority for SOSORT will be to foster a common language and therapeutic standards among the international community specialising in conservative scoliosis management. With the establishment of a clinical and conceptual framework for communication and planning, multicenter studies can be designed to measure the short and long-term efficacy of these approaches in maintaining health and function in children diagnosed with scoliosis” (Weiss *et al* 2006). Lack of clarity has contributed to individual studies being dismissed.

In their 2014 report, SOSORT stated that the role of exercise based therapies, as discussed in the spine literature, was controversial, with often repeated claims that research has shown that such approaches are ineffective in treating scoliosis (Negrini *et al* 2015). However, a systematic review of the historic articles published in English produced no data to support such claims. Controlled studies of different therapies are justified both on ethical and scientific grounds (Focarile *et al* 1991).

The 2014 consensus between SOSORT and the SRS non-operative management committee also recommended that:

- Ongoing high quality research and development focused on innovative, non-operative treatments for scoliosis

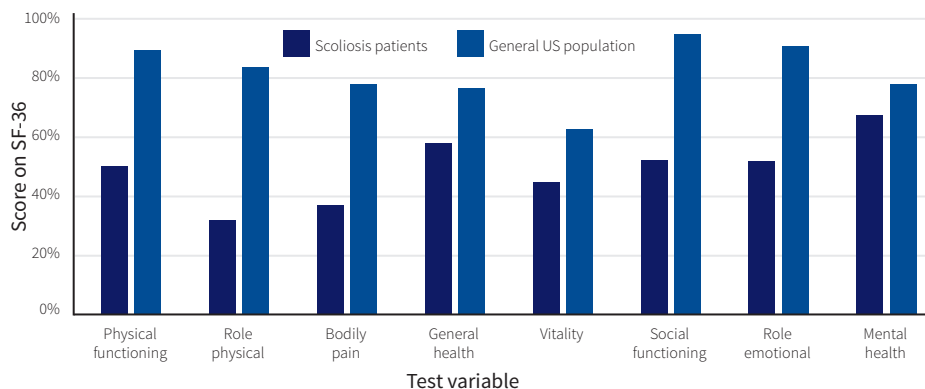


FIGURE 2: Results of short form tool general health questionnaire measuring American scoliosis patients compared to the health of the US population in general

“WITH THE FIGURES FOR SCOLIOSIS AS THEY ARE, IT SEEMS HARD TO DEFEND THAT PHYSIOS DON’T OFTEN COME ACROSS THE CONDITION”

and related spinal deformities.

- Indications and contraindications for non-operative approaches should be continuously researched by high quality studies.
- Risks and benefits of non-operative treatments should be continuously researched by high quality studies (Negrini *et al* 2015).

Even now, in 2016, SOSORT reports that well-documented studies on conservative and surgical management of scoliosis are still needed in order to balance the therapeutic approach to this disease. As an example, among 2,000 articles published on scoliosis in the last 10 years (Medline, 1996-2005) more than 800 (40%) have focused on surgery, but only 20 (1%) on prevention and control (Durmala 2016). Additionally, as recently as July 2016, SAUK has announced a priority setting partnership to find out what questions about scoliosis its members want the research to answer.

My understanding is that, in the UK, the efficacy of conservative treatment for scoliosis seems to rest on whether the curve can be stopped or, indeed, improved. I would maintain that adults with AIS know that the only thing that can achieve this outcome is fusion

surgery, but that comes with a host of possible further problems. I, personally, have done all I can to avoid that route. What scoliosis patients are seeking is targeted, conservative, non drug-related therapy exercises that will help with pain, while not exacerbating the condition.

One of the problems with assessing the effectiveness of non-operative treatment is the length of time it takes when, as the prevailing approach is to publish only final results, the research can be rare and very sparse, thereby reducing the possibility of knowledge and improvement of treatments. Couple this with the fact that it is a condition that is not seen as fashionable enough for any decent research, it is cheaper and easier to adopt a one-size-fits-all approach or fob off with painkillers and we end up with no targeted treatment at all. Scoliosis can take its toll on general health (figure 2). The authors of a US-based study “Adult Scoliosis: the current demographic”, conclude that symptomatic adult spine deformity (SASD) is a heterogeneous condition, and the patient’s deformity type and severity can have a debilitating impact on health. Often, this disability is worse than that of more recognised chronic diseases (Wick 2016).

The rapid rise of an elderly population has resulted in increased prevalence of adult degenerative, or de Novo scoliosis; add the 5.4% of AIS patients who do not get to surgical levels, and we have a great many people with untreated scoliosis.

Ironically, it may be that the increasing cases of de Novo scoliosis arising from the aging population will be one of the drivers for more research, not least because, in the US, abuse of prescription opioid medicines has reached epidemic proportions and is linked to thousands of overdose-related deaths every year. Insurance companies will need to become more supportive of physiotherapy treatment if it is offered as a recognised alternative to expensive surgical treatments. With the figures for scoliosis as they are, it seems hard to defend that physios don’t often come across the condition. Maybe the question that needs to be asked is “where are sufferers going for treatment?” Currently, the answer probably is “outside of the system” because they are offered very little from within it.

The future

I have read about ScolioGold and I am encouraged with how they have embraced traditional Schroth therapies (Kuru *et al* 2016) and incorporated other well-established, scientifically-proven, non-surgical spinal techniques from around the world. These include functional individual therapy (FITS), proprioceptive neuromuscular facilitation (PNF), and the scientific ➤

“SCOLIOSIS PATENTS ARE SEEKING TARGETED, CONSERVATIVE, NON DRUG-RELATED THERAPY EXERCISES THAT WILL HELP WITH PAIN”

exercise approach to scoliosis (SEAS), as well as the more well-known myofascial release and trigger point treatment. This is a welcome contribution to combating the lack of conservative treatment for scoliosis and I am delighted that they are physiotherapists.

However, their programmes are expensive and somewhat unattainable. I would maintain that we are unlikely to collect the necessary evidence to support conservative treatment for scoliosis in the conventional way. In fact, it could even be argued that the amount of the “wrong type” of evidence, and so many parties with a vested interest, is instrumental in preventing any consensus from being agreed. We need people from within the system to spearhead a change, using their patients as evidence. So much more needs to be done.

Conclusion

Physiotherapists need to be able to talk with their scoliosis patients about the condition and about individual muscles, what they do and how they work. They need to know which exercises put strain on the convex or concave part of the spinal curve and how a particular strengthening exercise will help. Those of us with scoliosis want to know that we can discuss our particular curve formation and our individual response to therapy. We do not want the generic stick-men exercises and a once-a-month review. **“Talk with people who need talking with, this is therapy. Educate your patient by all means, but also let them educate you”** (Kerry 2014). I truly believe that 30 minutes spent talking to an informed physiotherapist is as an effective form of pain management as manual therapy.

While, in the first instance, targeted manual therapy that focuses on an individual curve pattern might be difficult for the therapist, it is surely not impossible. Scoliotics want to know that we are physically stretching the right muscles and, above all, be confident that what we are doing is safe for our individual scoliosis. The “other side of

“I BELIEVE THAT 30 MINUTES SPENT TALKING TO AN INFORMED PHYSIOTHERAPIST IS AS AN EFFECTIVE FORM OF PAIN MANAGEMENT AS MANUAL THERAPY”

the mid-line” is not so relevant for us; it is good to develop a strong core, but it is not enough for the scoliosis patient.

With an asymmetric spine, great care must be taken during exercise and daily activities to avoid feeding into progression of the curvature(s) via movements that do not take into account the asymmetric nature of the particular curve pattern of the spine. It is possible to cause progression by doing the wrong thing for a particular curve pattern. Movement one way can be good for one side of the trunk, but harmful to the other (<https://scoliosis3dc.com>).

So, what do we scoliosis sufferers want? We want to feel that our condition is welcome in the treatment room even though we don’t, and never will, fit into the preferred treatment model. Just because we will probably never “get better” should not mean that we don’t deserve help. We know our curve won’t decrease, we just want help with dealing with what we have got already. We don’t want to be the only expert. We want more physiotherapists to specialise in structural scoliosis.

References

- Durmala J. President’s message. SOSORT 2016; www.sosort.org
- Focarile FA, Bonaldi A, Giarolo MA, Ferrari U, Zilioli E, Ottaviani C. Effectiveness of non-surgical treatment for IS; overview of available evidence. *Spine* 1991;16:395-401
- Kerry R. Evidence-based physiotherapy: a crisis in movement. Evidence 2014; <https://rogerkerry.wordpress.com/2014/09/29/evidence-based-physiotherapy-a-crisis-in-movement/>
- Kuru T, Yelden I, Dereli EE, Özdiñler AR, Dikici F, Çikaj I. The efficacy of three-dimensional Schroth exercises in adolescent idiopathic scoliosis: a randomised controlled clinical trial. *Clinical Rehabilitation* 2016;30(2):181-190

Negrini S, Hresko TM, O’Brien JP, Price N. Recommendations for research studies on treatment of idiopathic scoliosis: consensus 2014 between SOSORT and SRS non-operative management committee. *Scoliosis* 2015;10:8

Physio First. Pain Solution. *In Touch* 2015; (autumn) 152

Physio First. Pain Revolution. *In Touch* 2015; (winter) 153

Weiss HR, Negrini S, Hawes MC, Rigo M, Kotwicki T, Grivas TB, Maruyama T (and members of SOSORT). Physical exercises in the treatment of idiopathic scoliosis at risk of brace treatment – SOSORT consensus paper 2005. *Scoliosis* 2006;1:6

Wick J. Adult scoliosis: the current demographic. *Multiple Sclerosis Condition Center* 2016; Jan 11

Further reading

Negrini S, Grivas TB, Kotwicki T, Rigo M, Weiss HR. Why do we treat adolescent idiopathic scoliosis? What we want to obtain and to avoid for our patients: SOSORT 2005 consensus paper. *Scoliosis* 2006;1:4

Weiss HR. Spinal deformities rehabilitation: state of the art review. *Scoliosis* 2010;5:28

Useful websites

MedicineNet: www.medicinenet.com/scoliosis/article.htm

Physiotherapy site: www.thephysiotherapysite.co.uk/physiotherapy/back-pain/investigations

Scoliosis 3DC: <https://scoliosis3dc.com>

Scoliosis Journal: <http://scoliosisjournal.biomedcentral.com>

Setting Scoliosis Straight Foundation: www.settingscoliosisstraight.org ❌

Physio First 2017 conference

01 – 02 April 2017 East Midlands Conference Centre, Nottingham

BODY, BRAIN AND BUSINESS: TOOLS FOR SUCCESS

Our exciting line-up of international speakers includes **Dr Dylan Morrissey**, **Dr Paul Hodges**, **Dr Tania Pizzari**, **Dr Phil Glasgow** and **Igor Tak**.



early bird #2 discount!

available
only until 06 January 2017

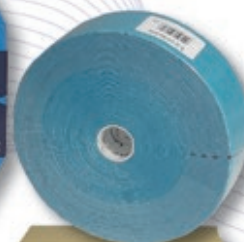
To secure your discount,
book your place now at
www.physiofirst.org.uk/events
or call our conference team on
01604 684 968

COMPLETE SUPPLY PARTNER FOR PHYSIOTHERAPISTS IN PRIVATE PRACTICE



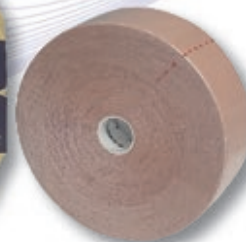
Levotape®
KINESIOLOGY TAPING

**NEW Clinic
Roll Lengths**



**BUY
NOW**

**ONLY
£19.99
ex vat**



Order online: WWW.VIVOMED.COM | Email us: info@vivomed.com | Telephone us: 028 4461 7666

The gluteus minimus in hip function and dysfunction

TANIA PIZZARI PhD BPhysio (Hons)

Director, Mill Park Physiotherapy; Lecturer/Researcher, La Trobe University, Melbourne, Australia; Research/Clinical Consultant, Clinical Advisory Panel Victorian Workcover Authority; Adjunct Senior Research Fellow, Australian Centre for Research into Injury in Sport and its Prevention

ADAM SEMCIW PhD BSc (Physio)

Physiotherapy Research Fellow, University of Queensland, Australia



The gluteus minimus (GMin) is increasingly recognised as an important muscle for hip health. Previous biomechanical modelling and cadaveric studies have identified two distinct segments and postulated that the GMin segments act as femoral head stabilisers. In hip dysfunction the GMin is most susceptible to structural and functional changes in comparison to the gluteus medius and maximus. In particular, the anterior GMin segment is most likely to display such deficits before the posterior segment. Considering the proposed role of anterior GMin in neutralising large forces in hip extension during gait for example, the condition of the GMin is an important consideration in normal hip activity and this has implications for rehabilitation of hip disorders. This article will outline what is known about the role, structure and function of the GMin in health and dysfunction and briefly discuss rehabilitation concepts.

LEARNING OUTCOMES

- 1 Understand the role of the deep hip muscles in function and dysfunction of the hip.
- 2 Appreciate the different segments of the gluteus minimus and its differential activation patterns.
- 3 Understand deviations in muscle function of the stabilising muscles in common hip disorders.
- 4 Identify therapeutic exercises to apply in the presence of hip muscle dysfunction and hip pathology.

Introduction

Gluteus minimus (GMin) is the smallest of the three gluteal muscles. It is a fan-shaped muscle that originates from the ilium, between the anterior and inferior gluteal lines. The distal insertion of GMin attaches by means of a tendon into the apex and anterior aspect of the greater trochanter (Flack *et al* 2014). Some muscle fibres have also been observed to attach into the anterior superior hip joint capsule (Flack *et al* 2014; Walters *et al* 2001).

Our research confirmed that the broad attachments of GMin result in two uniquely oriented segments within the muscle: the fascicles of the anterior and posterior segments (figure 1a) are oriented vertically and posteriorly respectively (Semciw *et al* 2013a) and arranged parallel (figure 1b) to the neck of femur (Gottschalk *et al* 1989). As a whole, GMin is theoretically considered an important femoral head stabiliser (Gottschalk *et al* 1989). The parallel arrangement of fibres (coronal plane) to the neck of femur seemingly enables them to draw the head of femur into the acetabulum, providing stability for the hip joint (figure 1b). Yet the unique segmental arrangement of fibres in the sagittal plane (figure 1a), and the additional capsular attachment of the anterior segment have led researchers and clinicians to attribute independent stabilising roles for each segment (Al-Hayani 2009; Gottschalk *et al* 1989; Semciw *et al* 2014).

Segmental response to pathology

Magnetic resonance imaging (MRI) studies have provided valuable insights

into the association between GMin muscle size and joint pathology. Our recent research identified atrophy and increased levels of fatty infiltration of GMin in patients with unilateral, moderate-to-severe OA (Zacharias *et al* 2016). This supports previous findings of GMin atrophy in people with lateral hip pain (Woodley *et al* 2008) and in fallers compared with non-fallers (Kiyoshige & Watanabe 2015).

Fatty infiltration of GMin has also been observed one year post-total hip arthroplasty (THA) (Muller *et al* 2011; Pfirrmann *et al* 2005) and as a result of the aging process (Chi *et al* 2015). Furthermore, specific fatty atrophy of the anterior segment of GMin has been noted following THA (Bremer *et al* 2011; Pfirrmann *et al* 2005) and in a sample of elderly cadavers (Flack *et al* 2014). From these studies it is clear that GMin muscle size is an important component of joint health. It is also evident that some conditions appear to detrimentally affect anterior GMin muscle size specifically, supporting the notion of functionally independent segments. However, these studies can only provide inferences

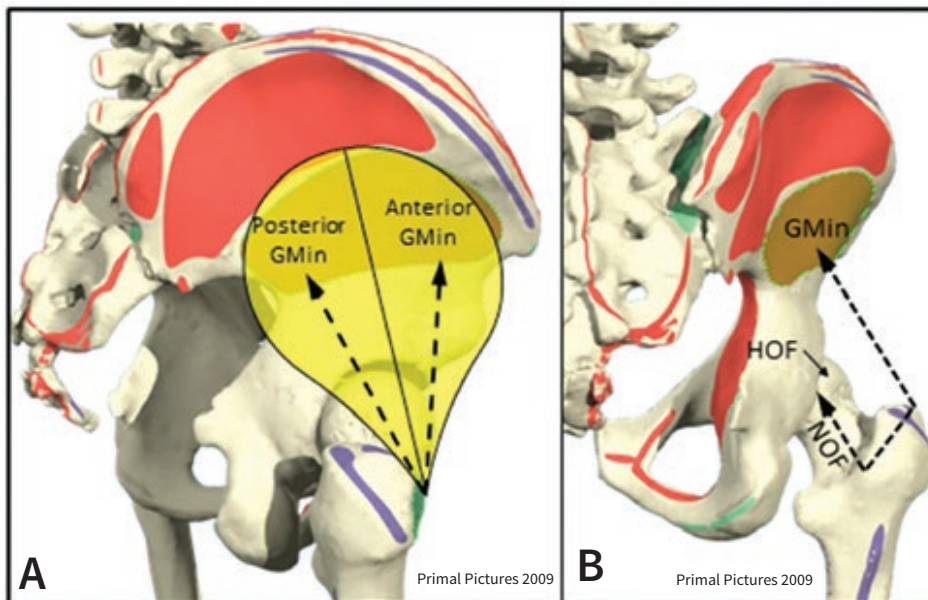


FIGURE 1: Illustration of gluteus minimus (GMin) fascicle orientation. A: Lateral view of the pelvis, illustrating the anterior and posterior fascicles oriented vertically and posteriorly respectively, in the sagittal plane. B: Posterior view of the pelvis, illustrating the parallel orientation of GMin fascicles to the neck of femur (NOF) in the coronal plane. This orientation would enable GMin to pull the head of femur (HOF) into the acetabulum, facilitating femoral head stability (3D anatomy images. Copyright: Primal Pictures Ltd. primalpictures.com)

as to the potential role of the GMin. For example, MRI studies (including functional MRI) do not provide us with clinically meaningful information regarding real-time temporal activation properties. In other words, they don't tell us "how we use it".

Normal gluteus minimus function

Until our recent electromyographic (EMG) investigation of GMin (Semciw *et al* 2014; Semciw *et al* 2016) there was only one other EMG study conducted, and this was published more than 30 years ago using now outdated processing and analysis techniques (Wilson *et al* 1976). The lack of EMG research into GMin is primarily because it is deeply located, and requires fine-wire EMG investigation. The superior gluteal neurovascular bundle (NVB) provides a further technical challenge in accessing this muscle with EMG electrodes (Semciw *et al* 2013b). As a side note, clinicians keen on dry needling GMin should also consider the implications of the NVB. Our results suggest that anterior and posterior GMin are indeed functionally independent (Semciw *et al* 2014). For instance, during a maximally resisted clam manoeuvre,

posterior GMin is active at moderate levels (48% of maximum), while anterior GMin is active at low levels (11% of maximum). Therefore, two structurally unique segments are contracting at largely different relative intensities for a given task.

We have also shown that this independent function translates into dynamic activities. When walking at comfortable self-selected speed, posterior GMin EMG activity peaks early in stance (figure 2), while anterior GMin

activity peaks significantly later, in mid-to-late stance (Semciw *et al* 2014). Each segment can therefore be functionally defined by "how we use it". The later peak of anterior GMin in stance is a unique property not shared by any other gluteal synergist. It is the only gluteal segment that tends to peak in activity as the hip joint extends throughout stance (Semciw *et al* 2013c). The functional importance of this role is potentially clarified in light of cadaveric and biomechanical studies that describe large joint forces transmitted by the head of femur onto the anterolateral hip joint capsule and labrum in positions of hip joint extension (Lewis *et al* 2007; Safran *et al* 2011).

Therefore, the later peak of anterior GMin EMG activity in stance (figure 2), may reflect a specific role in neutralising these large forces, much like the well-documented role of subscapularis in providing anterior shoulder stability (DePalma *et al* 1967). Consequently, a weak or inefficient anterior GMin could leave the anterior hip joint capsule and labrum vulnerable to shearing and injury. This could manifest in positions of hip extension, for example, when taking large strides, lunging on to a step or running.

Gluteus minimus function in the presence of deloading and pathology

Considering the seeming importance, particularly of the anterior GMin, in joint health, we set about investigating the

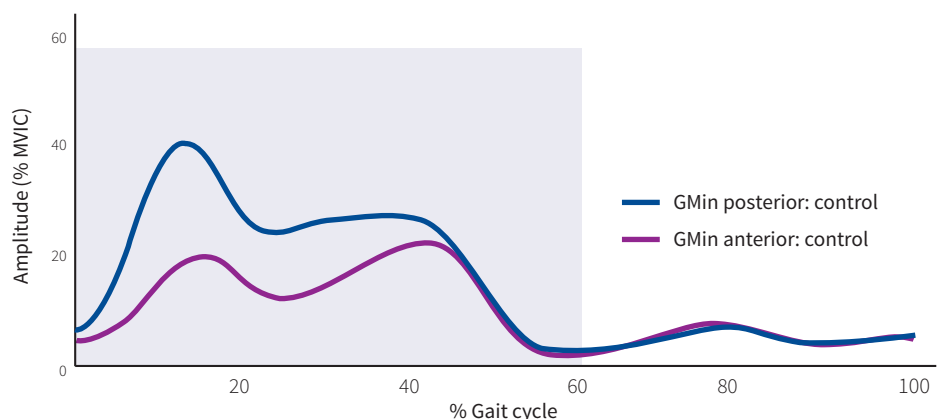


FIGURE 2: Grand ensemble of gluteus minimus (GMin) muscle activity during gait. Shaded percentage of gait cycle highlights the stance phase. %MVIC = Percentage maximal voluntary contraction. Both segments of GMin are biphasic with anterior GMin producing most activity in late stance (Semciw *et al* 2014)

"THE GREATER SECOND BURST OF ACTIVITY SEEN IN NORMAL HIPs IN LATE STANCE IS REVERSED"

EMG activity of the GMin segments in a number of clinical populations. To date, we have examined the GMin function in swimmers to determine if deloading impacts on deep hip muscle function (Semciw *et al* 2016). We have investigated patients with hip osteoarthritis (Zacharias *et al* unpublished) and lateral hip pain (Ganderton *et al* unpublished) and we were surprised to discover that the anterior GMin behaves differently in these populations when compared with matched controls (figures 3a, b & c). Specifically, the greater second burst of activity seen in normal hips in late stance is reversed in these populations and the anterior GMin displays a larger first burst. The muscle activation pattern appears synonymous with the posterior GMin and this may have implication for anterior hip joint stability in late stance.

We have postulated that this "reversal of the burst" activity of anterior GMin could be the result of a reduced stimulus if the patient has a reduced stride length and reduced hip extension during gait. If the anterior GMin is not required to support the front of the joint, then this could alter function and lead to the structural changes noted in previous research described above. The reverse might also occur whereby structural changes happen first as a result of an acute muscle or hip injury, or as a result of hours of sedentary activity in hip flexion. These are followed by functional changes, including reduced muscle activation, strength and stride length.

What does this mean for clinical practice?

The emerging evidence of structural and functional deficits in the anterior GMin have directed our focus to examining rehabilitation exercises and strategies

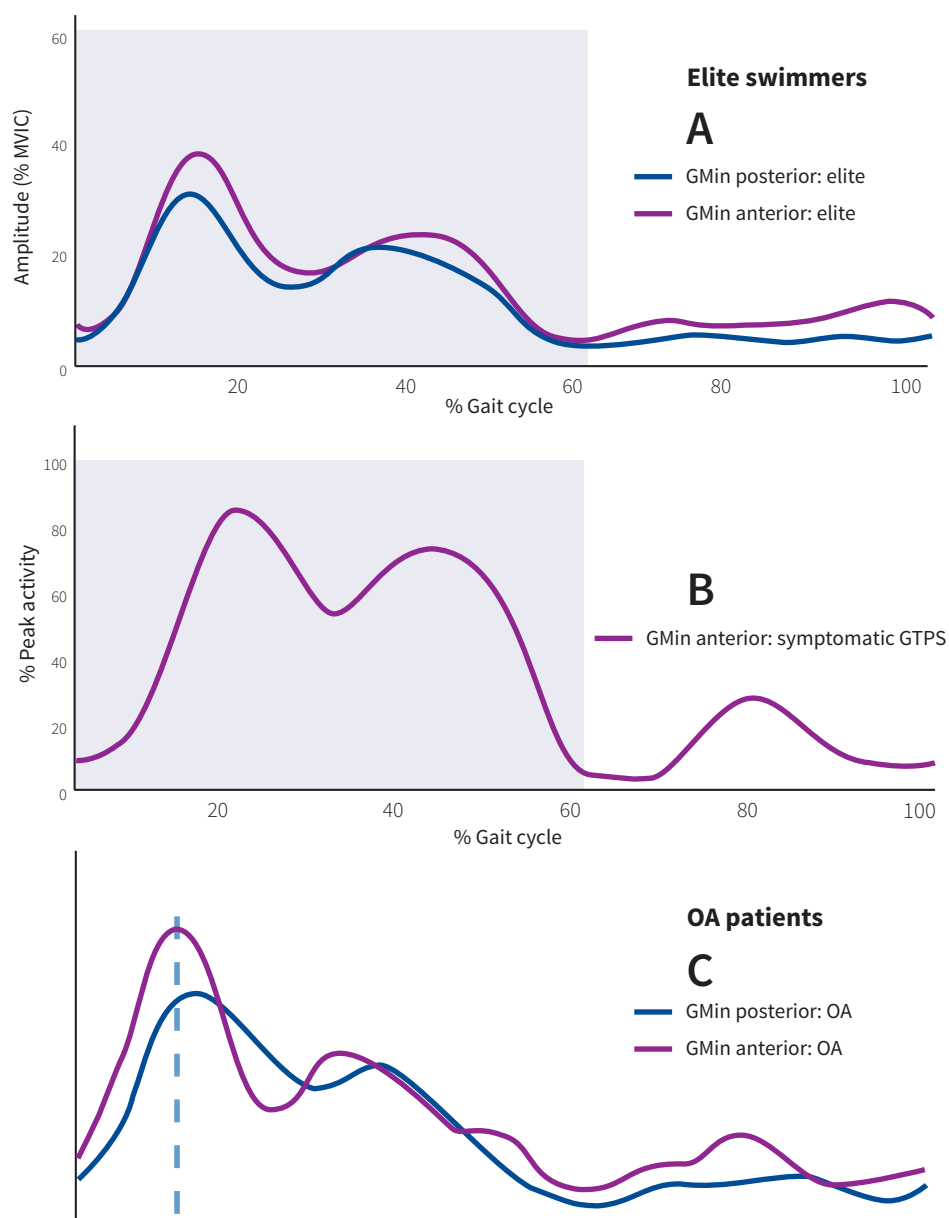


FIGURE 3: Grand ensemble of gluteus minimus (GMin) muscle activity during gait. A: Elite swimmers, demonstrating anterior GMin synonymous with posterior GMin and a reversal of the expected burst profile (larger second burst) when compared to controls. B: Symptomatic lateral hip pain population. Reversal of the burst for anterior GMin when compared with age and gender matched controls (Ganderton *et al* unpublished). C: Moderate to severe hip osteoarthritis patients. GMin synonymous with posterior GMin and a reversal of the burst profile in comparison to age and gender matched controls (Zacharias *et al* unpublished)

to target this muscle. Rehabilitation of gluteus medius is a common focus for physiotherapists and there are a plethora of exercises that have been reported and prescribed (Reiman *et al* 2012). Currently, there are no studies or rehabilitation protocols for GMin but, at the time of writing we are investigating the influence of gait re-education on anterior GMin and hope to be able to share some results from this study at the Physio First 2017 annual conference. We have recently completed a study into the activation of deep gluteal muscles

during rehabilitation exercises, such as single leg squat, standing resisted hip abduction/extension, running man, side lying abduction, clam and single leg bridge, and found the anterior GMin to be minimally active in all except the standing resisted hip abduction/extension. In further pilot testing we have identified that maintaining the hip in neutral or slight extension, and producing an internal rotation moment, produces adequate anterior GMin muscle activation.

Summary

Current EMG evidence adds to existing biomechanical, cadaveric and radiological data to suggest that how we use anterior GMin is important. By activating in positions of hip joint extension, anterior GMin is proposed to have a vital role in anterior hip joint stability. This article has provided some preliminary observations that may lead clinicians to suspect anterior GMin dysfunction and offered a potential goal for rehabilitation. To learn more, and for a chance to meet the author and discuss the various research studies and what the results might mean for your practice, book your place at the Physio First 2017 annual conference today.

About the authors

Dr Tania Pizzari is a principal physiotherapist and co-owner of a physiotherapy practice in Melbourne, Australia, and researcher in the La Trobe University Sports and Exercise Medicine Centre. Her research interests include rehabilitation for shoulder conditions, EMG of the shoulder and hip, hamstring injuries and hip muscle structure, function and rehabilitation. Tania is a member of the Shoulder and Elbow Physiotherapists of Australasia and an adjunct senior research fellow in an International Olympic Committee research centre: the Australian Centre for Research into Injury in Sport and its Prevention.

Dr Adam Semciw graduated as a physiotherapist from the University of Sydney in 2001 and completed his PhD at La Trobe University in 2013. In 2015, Adam joined the University of Queensland as a Research Fellow; a conjoint position with Queensland Health. During his PhD, Adam pioneered a novel method for investigating the function of deep gluteal muscles. The techniques he developed have won four awards at national and international conferences from 2010 to 2014. The methods are now being used to investigate the function of the deep gluteal muscles in a range of pathological conditions, including greater trochanteric pain syndrome (lateral hip pain) and lower limb osteoarthritis.

CONTACT DETAILS

t.pizzari@latrobe.edu.au
@DrTaniaPizzari
a.semciw@uq.edu.au
@asemciw

References

- Al-Hayani A. The functional anatomy of hip abductors. *Folia Morphol (Warsz)* 2009;68(2):98-103
- Bremer AK, Kalberer F, Pfirrmann CW, Dora C. Soft-tissue changes in hip abductor muscles and tendons after total hip replacement: comparison between the direct anterior and the transgluteal approaches. *British Journal of Bone Joint Surgery* 2011;93(7):886-889
- Chi AS, Long SS, Zoga AC, Read PJ, Deely DM, Parker L, Morrison WB. Prevalence and pattern of gluteus medius and minimus tendon pathology and muscle atrophy in older individuals using MRI. *Skeletal Radiology* 2015;44(12):1727-1733
- DePalma AF, Cooke AJ, Prabhakar M. The role of the subscapularis in recurrent anterior dislocations of the shoulder. *Clinical Orthopaedics and Related Research* 1967;54:35-49
- Flack NA, Nicholson HD, Woodley SJ. The anatomy of the hip abductor muscles. *Clinical Anatomy* 2014;27(2):241-253
- Gottschalk F, Kourosh S, Leveau B. The functional anatomy of tensor fasciae latae and gluteus medius and minimus. *Anatomy* 1989;166:179-189
- Kiyoshige Y, Watanabe E. Fatty degeneration of gluteus minimus muscle as a predictor of falls. *Archives of Gerontology and Geriatrics* 2015;60(1):59-61
- Lewis CL, Sahrmann SA, Moran DW. Anterior hip joint force increases with hip extension, decreased gluteal force, or decreased iliopsoas force. *Biomechanics* 2007;40(16):3725-3731
- Muller M, Tohtz S, Springer I, Dewey M, Perka C. Randomized controlled trial of abductor muscle damage in relation to the surgical approach for primary total hip replacement: minimally invasive anterolateral versus modified direct lateral approach. *Archives of Orthopaedic Trauma Surgery* 2011;131(2):179-189
- Pfirrmann CW, Notzli HP, Dora C, Hodler J, Zanetti M. Abductor tendons and muscles assessed at MR imaging after total hip arthroplasty in asymptomatic and symptomatic patients. *Radiology* 2005;235(3):969-976
- Reiman MP, Bolgla LA, Loudon JK. A literature review of studies evaluating gluteus maximus and gluteus medius activation during rehabilitation exercises. *Physiotherapy Theory and Practice* 2012;28(4):257-268
- Safran MR, Giordano G, Lindsey DP, Gold GE, Rosenberg J, Zaffagnini S, Giori NJ. Strains across the acetabular labrum during hip motion: a cadaveric model. *American Journal of Sports Medicine* 2011;39:92S-102S
- Semciw AI, Green RA, Pizzari T. Gluteal muscle function and size in swimmers. *Science and Medicine in Sport* 2016;19(6):498-503
- Semciw AI, Green RA, Murley GS, Pizzari T. Gluteus minimus: an intramuscular EMG investigation of anterior and posterior segments during gait. *Gait Posture* 2014;39(2):822-826
- Semciw AI, Pizzari T, Green RA. Technical application and the level of discomfort associated with an intramuscular electromyographic investigation into gluteus minimus and gluteus medius. *Gait Posture* 2013a;38(1):157-160
- Semciw AI, Green RA, Pizzari T, Briggs C. Verification of a standardized method for inserting intramuscular EMG electrodes into uniquely oriented segments of gluteus minimus and gluteus medius. *Clinical Anatomy* 2013b;26(2):244-252
- Semciw AI, Pizzari T, Murley GS, Green RA. Gluteus medius: an intramuscular EMG investigation of anterior, middle and posterior segments during gait. *Electromyography and Kinesiology* 2013c;23(4):858-864
- Walters J, Solomons M, Davies J. Gluteus minimus: observations on its insertion. *Anatomy* 2001;198(2):239-242
- Wilson GL, Capen EK, Stubbs NB. A fine-wire electromyographic investigation of the gluteus minimus and gluteus medius muscles. Research Quarterly. American Alliance for Health, *Physical Education and Recreation* 1976; 47(4): 824-828.
- Woodley SJ, Nicholson HD, Livingstone V, Doyle TC, Meikle GR, Macintosh JE, Mercer SR. Lateral hip pain: findings from magnetic resonance imaging and clinical examination. *Orthopaedic and Sports Physical Therapy* 2008;38(6):313-328
- Zacharias A, Pizzari T, English D, Kapakoulakis T, Green RA. Hip abductor muscle volume in hip osteoarthritis and matched controls. *Osteoarthritis Cartilage* 2016;Epub:doi: 10.1016/j.joca.2016.05.002

Physio First's Quality Assured Practitioner scheme is launched



MEMBER

PHYSIO
EST. 1952 **FIRST**



In our November *Update* our Chairman, Pam Simpson, highlighted details about our own, exclusive Quality Assured Practitioner (QAP) scheme and what it means for us as members, our stakeholders and the wider healthcare marketplace. The edition also answered some essential questions which we have reproduced here to emphasise the importance of this exciting Physio First initiative.

WHAT EXACTLY IS A PHYSIO FIRST QUALITY ASSURED PRACTITIONER?

A Physio First QAP is a full or affiliate member who has input sufficient data through our Physio First Data for Impact (Dfi) tool, and whose data meets the criteria as defined by Physio First, in collaboration with the University of Brighton. The member will also have committed to completing a validated patient recorded outcome measure (PROM), which will contribute to the overall validation of our data in the future, and will use a patient recorded experience measure (PREM) in their practice.

WHY DO WE NEED THIS SCHEME?

Society and the healthcare marketplace demands authenticity. Validated data can be turned into evidence of our authenticity in so many ways.

As individuals, we give and share data every day, everywhere we go – from interactive fitness apps, to retail reward cards, to hotel loyalty discounts. In the healthcare marketplace, authenticity means being able to prove our cost-effectiveness and, as self-employed private practitioners, this is demonstrated by measurable quality treatment with outcomes.

HOW DO I BECOME A QAP?

All applicants must be either full or

affiliated members of our organisation and be inputting data into our Data for Impact (Dfi) tool to the level of receiving their individualised report, by having submitted data sets of 50 discharged patients to the University of Brighton (UoB).

Where these data sets demonstrate that the practitioner exceeds the agreed baseline quality, as set by Physio First and the UoB, they can be termed a Physio First Quality Assured Practitioner. In future, we aim for this data to be independently verified by patients through a validated PROM, and possibly a PREM.

HOW HAS THE BASELINE BEEN SET?

Thanks to those of our members who have participated in our Dfi tool since its launch, we are fortunate to have access to a bank of clinical data and geographical coverage that is representative of our whole membership.

Together with the University of Brighton, Physio First has worked with this data to reach agreed and realistic QAP baseline levels based on an “equation” of outcomes that directly relate to the following areas of our Dfi tool:

- Goal achievement
- Outcome of referral
- Number of treatments
- FPS (functional, physical and subjective) score changes between initial and discharge appointments
- Time between referral and commencement of treatment.

In addition, a validated PROM will be required for each patient in order to provide the independent perspective.

The next step in the development of our Dfi project will be to enable the automatic collection of PROMS directly from the patient and match them to the data collected by the individual clinician. This gives us a further, but necessary, layer of independent validation.

Once a member acquires QAP status, there will be a simple process to ensure that they continue to meet the baseline in order to retain this accreditation, otherwise the credibility of our whole scheme will be undermined.

SHOULD I COLLECT DATA ON EVERY PATIENT?

Initially, members participating in Dfi did so with a random selection of patients. However, for our data to be really robust and defensible, members will be required to collect data on every new patient. If we collect data on every new patient we cannot be criticised for any form of bias regarding data entry.

IS IT ACCEPTABLE TO COLLECT DATA DURING A PATIENT'S TREATMENT?

The collection of data during a patient's treatment session is not only acceptable but an inevitable development. It is a practice supported by the HCPC in their regulations published in August 2013.

WHY IS THIS DATA DIFFERENT FROM THAT COLLECTED ELSEWHERE?

Our data is about true outcomes and the combination of factors that reflect the severity and complexity of the individual's condition, the goals of the patient and the ability/competence of the therapist to manage that condition effectively. This is a unique equation that we believe has no equal in any other data collection scheme either nationally or internationally.

Many members already collect their own data through their practice management software. However, our Physio First DfI project collects data through a validated standardised system that is analysed by the UoB as an independent, unbiased third party, against the average outcomes in our growing data bank. While the data we collect in our own practices is of use to us as individual practitioners, it is not standardised nor analysed by a third party and so cannot be defensible in the same way.

CAN MY CLINIC BE QUALITY ASSURED?

At present, our QAP scheme is only available to individual Physio First members.

We are, however, considering the scenario when, where all MSK clinicians in a practice are Physio First members, it might be possible to award a "clinic" QAP status. We will keep you informed of the developments for this. In the meantime, if you wish to work towards this clinic status, we suggest you encourage your non-member colleagues to join and start to collect their own data and to become Physio First QAPs.

As our Physio First QAP scheme is about the future of self-employed private practitioners and their employees, having sufficient numbers of QAPs and an impressively large data bank will enable us to champion just how evidence-based and cost-effective we are, so we want to encourage as many self-employed private practitioners, and their employees as affiliate members, to join us in this goal.

WILL IT MATTER IF I DON'T WANT TO BECOME A QAP?

No, of course not. There will be some of us who choose not to become a Physio First QAP because this sort of scheme does not match our own business model, type of practice, future plans or time of life. For instance, our QAP scheme is currently available only to those of our members with MSK as their main speciality. This is because our 2016 Practice Profiling survey demonstrated that this applies to more than 90% of Physio First members. Equally, where a member is part-time, they may feel that the current requirements for data collection will take them too long to achieve. We do plan to investigate how our QAP scheme can be expanded to include other private practice specialisms and reflect the relationship between a practitioner's working hours and the number of data sets required.

We will communicate our progress as soon as we have a solution. In the meantime, we continue to benefit all members and encourage participation in our DfI project in order to enable us to produce robust and detailed data on what our members do.

WHAT MIGHT AN ORGANISED NETWORK OF PHYSIO FIRST QAPS BE ABLE TO ACHIEVE?

We have had a plan in place since 2013 to work towards the creation of business entities that are private practitioner owned and that can compete in the

marketplace with private medical insurers, commercial intermediaries and even expand self-employed private practice beyond its current boundaries. For more details, read the article about our Goal 9 symposium in the November edition of *Update*.

IF I BECOME A PHYSIO FIRST QAP, DO I HAVE TO BE PART OF THIS SEPARATE GOAL 9 ENTITY?

No. This will be an individual business decision. You may wish to market your Physio First QAP status directly to your patient group. Alternatively, you may wish to join with others where you share the risk of entering the marketplace as a profit sharing supplier of physiotherapy and then, of course, share the rewards of success once trading.

... AND FINALLY

If you have not already seen this information in our November *Update*, please read the edition online at www.physiofirst.org.uk. You can also find details on our QAP scheme in the **Benefits** section of our website as this is one of our Big 5 benefits to our members, and please watch out for e-alerts with progress updates as they are available. Now is the time to get involved and be part of our collective goal to champion cost-effective, evidence-based private physiotherapy in the healthcare marketplace. ☒

"A PHYSIO FIRST QAP IS A FULL OR AFFILIATE MEMBER WHO HAS INPUT SUFFICIENT DATA THROUGH OUR PHYSIO FIRST DATA FOR IMPACT (DFI) TOOL..."



Education programme courses

BOOK ONLINE AT WWW.PHYSIOFIRST.ORG.UK AND RECEIVE OUR £10 DISCOUNT

For more information on all of our courses, and to book your place, visit www.physiofirst.org.uk or call 01604 684 968

REGION	TITLE / TUTOR	DATE	VENUE	ONLINE COST†	STANDARD COST†	EVENT REF
NW Met	CPR	Monday 23 January 2017	Ruislip Golf Course	N/A	Member £60 Non-member £70	CPR0617
Scotland	Young athlete from screening to application	Saturday 18 March 2017	Life Fit Wellness, Falkirk	Member £135 Non-member £165	Member £145 Non-member £175	MUS30817
Wessex	CPR	Thursday 02 February 2017	Hart Leisure Centre, Fleet	N/A	Member £60 Non-member £70	CPR0717

Education Day 2017

Friday 31 March 2017. East Midlands Conference Centre, Nottingham

TITLE	TUTOR	EVENT REF
Managing lower limb tendinopathies in private practice	Seth O'Neill	ED117
Trigger points and myofascial pain and dysfunction	Jonathan Hobbs	ED217
Ball and socket joints: an evidence and principle-based approach to management	Tania Pizzari	ED317
Enhancing treatment opportunities for athletes with hip and groin pain	Igor Tak	ED417
Groundbreaking symposium – Physio First Goal 9 An exciting, fun, provocative and challenging way to investigate the first private, physio-owned and controlled co-operatives. This is your chance to shape the future of our industry.	Richard Katz Director of Contracting and Business Development, Therapeutic Associates Kyle Lunn Director, Blue Zinc James Butler Director, Painless Practice Pam Simpson Chairman, Physio First	ED517

ONLINE COST Member £155 / Non-member £185

STANDARD COST Member £165 / Non-member £195

To book any centrally run course, please go to our **Events** page at www.physiofirst.org.uk or call our Education team on **01604 684 968**.

Regional courses

Kent	Thursday 02 March 2017 Member: £45; Non-member: £55 (price includes USB flash drive with course content)	Know Pain : a patient-centred approach to managing persistent pain Mike Stewart	The Swan, 35 Swan Street, West Malling, Kent ME19 6JU	Contact: lizthephys09@gmail.com
Surrey	Tuesday 17 January 2017 Member: £30 Non-member: £35	Patellofemoral OA – improve your practice	Weybridge Physiotherapy, 10 Church Street, Weybridge KT13 8DX	Contact: info@jyphysiotherapy.co.uk

Working for us with our commercial partners

Don't forget to explore our commercial partner pages on our website

www.physiofirst.org.uk/resources/commercial-partners.html

to see how you can obtain exclusive member-only benefits!

Benefits include:

Online Ergonomics

A specialist supplier of ergonomic office products to wholesale and retail customers. Be sure to visit them in suite 1 at our annual conference in April 2017!



Blue Zinc

Exclusive rates with TM3 Practice Management software – receive 10% discount on new purchases.



Painless Practice

A suite of six business-related CPD events designed exclusively for members. Don't forget to book on to the first two workshops for 2017:

Business strategy

14 March 2017 | London

16 March 2017 | Leeds

Turning plans into action

10 May 2017 | London

18 May 2017 | Leeds

www.painlesspractice.com



Physiotec

Member-only discount – 10% off the standard fee for exercise prescription software plus access to the Physio First Orthopaedic module.



PhysioTools

Physio First members receive 15% discount on all PhysioTools products – start using PhysioTools for only £9 a month.



Vivomed

Physio First members receive 10% off all orders placed with Vivomed, plus additional free delivery on orders over £120.



Towergate Insurance brokers

Physio First has been a partner of Towergate for some time now and our members receive specially discounted rates on clinic insurance.

Patterson Medical

As part of the partnership with Physio First, all members will gain access to a number of offers including 15% off all servicing of couches and electrotherapy equipment.



For more information, see our website www.physiofirst.org.uk

Physio First Working for us



Save!

Tips from our team

2017-2018 SUBSCRIPTION AND DIRECT DEBITS

Why not save yourself £10 and set up a direct debit today!

Great news for full and affiliate members: by completing and submitting a direct debit instruction, you will save £10!

Our new membership year begins on 01 April 2017 and subscriptions from all active direct debits will be taken on or after this date.

If you have a direct debit instruction set up, but have had any change in your bank details since April 2016, we would require you to complete another direct debit instruction.

To do this, you can locate a new direct debit form on our website www.physiofirst.org.uk

- Log in with your membership number and password
- Click on **My Physio First**
- Click on **Renewals**
- Scroll down to **Direct Debit Instruction** where you can print off a form to complete and return to the Physio First Head Office.

All direct debit instruction forms must be signed and posted to:

Physio First, Minerva House, Tithe Barn Way, Swan Valley, Northampton NN4 9BA before Thursday 23 February 2017. After this date, renewals can only be taken manually and therefore will not benefit from the £10 discount.

Data for Impact



Data for Impact is our online data collection project which enables us to analyse your clinical data and use it as an evidence base to help improve the efficacy of private physiotherapy.

The University of Brighton analyses and collates the data into a national interim report every two months which members can access on our Physio First website.

HOW CAN YOU USE IT?

Data for Impact can be used to collect, record and view anonymised patient data and assess the outcomes of treatments and patient trends.

Data reports can support Continued Professional Development training needs and your own application to be one of our new Physio First Quality Assured Practitioners.

Standardised data can be analysed and used to measure your patient outcomes. It shows the public and your patients the quality and efficiency of private physiotherapy.

For more information about our Data for Impact study, please visit our website www.physiofirst.org.uk or call the University of Brighton on 01273 641802 and Physio First on 01604 684960.

PPEF update report



"Helping physiotherapy make a difference"

In July this year, the PPEF board of Trustees interviewed for our vacant Trustee post and, although the decision requires final confirmation at our PPEF AGM in April 2017, we are delighted to announce that Lin Connor has agreed to become a PPEF Trustee and is currently in the process of getting to grips with PPEF business.

As past honorary Conference Chair, past Editor of *In Touch*, and currently the Physio First Vice-President, Lin brings a wealth of knowledge and experience

of private physiotherapy which will be invaluable to PPEF.

Our busy times continue, and work has now started on our rebranding process with professional designers involved leading us in the right direction. At the time of writing this, our new logo is being prepared and will be followed closely by our new website.

The trustees of the PPEF have also decided that the Memorandum and Articles of Association of the Foundation should be reviewed and updated. A solicitor specialising in charity law has been commissioned to look at these.

Under business as usual we have, over the past three months, awarded five scholarships and two conference / poster presentation grants, and contributed to a national charity. We hope many of the successful applicants will disseminate their work to the physiotherapy community through Physio First members in the near future, by supplying articles for publication in *In Touch*, and thereby "helping physiotherapy make a difference".

Louise Dodds

Lin Connor joins as a new PPEF Trustee



Physio First profiling survey for 2017

At Physio First, we offer our own research strategy in which full and affiliate members are encouraged to participate and contribute.

From time to time, we will invite you to complete our unique Practice Profiling survey. Your answers enable Physio First

to benchmark our members' businesses against those of other, non-Physio First private physiotherapists, and to gain a better understanding of the private healthcare marketplace in general.

Almost 25% of our members took part in our most recent survey, and those who did benefited from full, exclusive access to the resulting reports that contained

valuable information about how they compared to a range of criteria specific to physiotherapists and their businesses. The aim is that this intelligence will help those of our members who participate to develop and market their businesses for the future.

Our 2015/2016 survey is now closed. We are, however, in the process of building a new survey with revised questions for 2017. Please keep an eye on our website www.physiofirst.org.uk/benefits/benchmark-your-practice.html and for any e-alerts with your invitation to participate. Even if you have taken part in our previous survey, the new questions will give you brand new information to work with, and you can only benefit from the results if you take part.

For general information about our Practice Profiling survey, please go to our website www.physiofirst.org.uk and see our **benchmarking your practice** pages, or contact our friendly membership team on 01604 684960.



Small ads

Advertise here
for full details
see page 15



EMS PHYSIO LTD for service and sales of
electrotherapy equipment and physiotherapy supplies
with over 92 years of experience in the industry
We are also exclusive UK agents
for the Zimmer EnPuls Shockwave
and Osteotron LIPUS devices

making it better since 1924



Visit our website for exclusive
UK manufacturer offers




www.emsphysio.co.uk t:01235 772 272 e:sales@emsphysio.co.uk

SERVICE & REPAIR: MATHUR ELECTRO-MEDICAL LTD

Sales and servicing of all physiotherapy equipment. New and second hand guaranteed available. For prompt, reliable service:
telephone: 01273 842425 • mobile: 07850 858584 • email: mathurelectromedical@hotmail.com

RWR SERVICES

Service and repairs of all Physiotherapy Electrotherapy and Rehabilitation Equipment
Sales of new and refurbished equipment • Second hand equipment bought and sold • Full support of the **SHREWSBURY** product range
For further details visit: www.rwrservices.co.uk • Tel: 0345 257 8925 / 01743 860432 • Email: richard@rwrservices.co.uk



We are the sole UK agents for
Enraf Nonius & Gymna Uniphy

Offering nationwide coverage for both
service and sales
Thinking of upgrading? We offer trade in of
your old device against a new machine!
Comprehensive range of consumables and
capital equipment
Check our website for the latest 2nd hand
equipment & special offers!



www.phoenix-healthcare.co.uk
0115 965 6634

trimbio

Tel: 01403 597 597
Email: info@trimbio.co.uk

trimbio has over 40 years of service and repair experience in the physiotherapy market; we
have been trained over the years by all the leading manufacturers such as:

Enraf Nonius - Chattanooga - Gymna-Uniphy - EMS Physio
Shrewsbury Medical - Plinth 2000 - Akron - Physiomed - Tunturi
to name but a few...

We offer:

Service and repair of all types of physiotherapy products & devices.
Trade - in of your old devices and couches for new.
Supply of new products - capital and consumables.
Supply of reconditioned couches and devices.



For more details and to purchase please visit our website:

Electrotherapy Devices

Treatment Couches

www.trimbio.co.uk

COPY DATE FOR *IN TOUCH* 158 SPRING EDITION 2017 – 3 FEBRUARY 2017

Published by Physio First. Physio First, Minerva House, Tithe Barn Way, Swan Valley, Northampton NN4 9BA.

Tel 01604 684960 Fax 01604 589238 • email minerva@physiofirst.org.uk • www.physiofirst.org.uk

All enquiries for *In Touch* to: Paul Johnson, Editor. email: editor@physiofirst.org.uk or post to: Physio First, Minerva House,
Tithe Barn Way, Northampton NN4 9BA. The editorial board reserves the right to edit all material submitted.

The views expressed in this journal are not necessarily those of the organisation, the editor or the editorial committee. The inclusion of editorial material
in this journal does not imply any form of endorsement by this organisation. No article, drawing or photograph may be reproduced without prior
permission of the editor. *In Touch* is a quarterly publication and is published in March, June, September and December each year.

Design and production by Pages Creative (Cheltenham) Ltd. www.pagescreative.co.uk

Printed by Severn, Gloucester on FSC Essential Silk to ISO9001 quality and ISO14001 environmental standards.
Using 100% renewable energy from Ecotricity.



Formthotics™

Custom Medical Orthotics

Custom foot orthotics

Formthotics™ can be gently heated to mould to the shape of the foot and shoe.

Lasting new shape

They are 3D milled (cut) from a unique thermoplastic 'closed cell' Formax™ foam, which is able to retain a new shape after it is heated, even after intense use.



Formthotics™
Training Courses available

Designed and manufactured by



Dual Density Formthotics™

Made from 2 layers of foam. The top layer is a soft foam for cushioning, the bottom layer provides support and strength.

- Suitable for conditions where additional cushioning is required without compromising stability or functional control e.g. plantar fascia problems or tibial stress syndrome
- Allows for better tolerance and patient acceptance of orthoses

Original Single Soft - Burgundy

- Mild functional support with maximum cushioning and comfort
- Suitable for the elderly, diabetic and arthritic patients or those with rigid or sensitive feet
- Not suitable for larger people with heavy frames



Code	Size	UK Shoe Size	NOW
09 127 1170	XXSmall	1 - 2.5	£17.70
09 127 1154	XSmall	3 - 4.5	£17.70
09 127 1139	Small	5 - 6.5	£17.70
09 127 1121	Medium	7 - 8	£17.70
09 127 1113	Large	8.5 - 9.5	£17.70
09 127 1147	XLarge	10-11.5	£17.70
09 127 1162	XXLarge	12-14	£17.70

Original Single Medium - Blue

- The original Formthotics™ model of medium density
- Suitable for effective use in a broad range of clinical applications where management of patient biomechanics and functions will improve



Code	Size	UK Shoe Size	NOW
09 153 9097	Youth	11-12	£17.70
09 153 9089	Youth	13-1	£17.70
09 127 1105	Youth	1.5 - 2.5	£17.70
09 127 1089	XSmall	3 - 4.5	£17.70
09 127 1063	Small	5 - 6.5	£17.70
09 127 1055	Medium	7 - 8	£17.70
09 127 1048	Large	8.5 - 9.5	£17.70
09 127 1071	XLarge	10-11.5	£17.70
09 127 1097	XXLarge	12-14	£17.70

PLEASE QUOTE INTOUCH31 TO GET THESE EXCLUSIVE OFFERS!

OFFER MUST END 28th FEBRUARY 2017

Please contact your Sales Representative today or Customer Services on:

Tel: **03448 730 035**

email: medical.sales@pattersonmedical.com

*All prices exclude VAT


PATTERSON
MEDICAL

WE'RE ABOUT TO CHANGE THE INDUSTRY. AGAIN!



COMING SOON
THE INDUSTRY'S MOST ANTICIPATED
CLINICAL NOTES

www.tm3pm.com/clinical-notes

TM3