Clinical, practical & evidence-based strategies to manage the runner across the lifespan.
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OBJECTIVES
- At the conclusion of this presentation, the participant will be able to:
  - Understand epidemiology of running injuries across the lifespan
  - Understand common injuries associated with running
  - Perform assessments and video analysis of a runner
  - Visualize biomechanics of various and ideal running forms
  - Utilize evidence based interventions for management of running injuries
  - Perform prevention drills for runners
  - Promote your running program

2014 Running Statistics
- There's been a 300% growth in running event finishers from 1990-2013
  - 18,750,000 finishers in U.S. running events in 2014
  - Females account for 57% of event finishers
- The 5K is the number one race followed by the half marathon
More Statistics

- Since 2004 there's been a 70% increase in running/jogging in U.S. totaling 42,000,000 participants
- Females age 25-34 are the lead participation group totaling 5.6 million
- Runners who run/jog >110 days/year totals 9,944,000
- Total number of high school cross country participants in 2014 was 472,597
- Track and field participants were 1,197,824

Does running indoor or outdoor have an effect on mental well being? (Coon et al., 2011)

An outdoor run resulted in feelings of less anger, less hostility, less anxiety, less depression and less fatigue!

Is there a definition of a Running-related Injury? (RRI)

“Running-related (training or competition) musculoskeletal pain in the lower limbs that causes a restriction on or a stoppage of running (distance, speed, duration, training) for at least 7 days or 3 consecutive scheduled training sessions or that requires the runner to consult a physician or health professional.” Yamato et al., 2015. (A 3 round Delphi approach with 38 researchers and 26 gave 80% consensus)
Why was there a need to develop a definition of Running-related Injuries?

RRI's had an Incidence Rate ranging from 24% to 84.9% across an analysis of 8404 initial articles with 48 that fit the Systematic Review. (Yamato et al., 2015).

Running-Related Injuries (RRI)

In a 9 week prospective study of 210 male & female novice runners, 16.2% sustained RRI's.

<table>
<thead>
<tr>
<th>Body Part</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee</td>
<td>41%</td>
</tr>
<tr>
<td>Lower Leg</td>
<td>23.5%</td>
</tr>
<tr>
<td>Ankle</td>
<td>12%</td>
</tr>
</tbody>
</table>

* A HIGHER LOADING RATE IN MALES WAS THE ONLY SIGNIFICANT FACTOR (Bredeweg et al., 2012)

Intrinsic Behaviors of the Foot

Even back in 1989, Robbins et al., were studying intrinsic behaviors of the shod and unshod foot. When barefoot there is plantar sensory feedback that protects the bony structures and simulates the intrinsic foot musculature to promote safe and effective locomotion.
What are the main risk factors for running injuries? (Sargiotto et al., 2014)
- Main risk factor was previous running injury in last 12 months.
- Higher Q angle
- Training more than 40 miles per week
- MEN: running 3-7x/wk
- WOMEN: 7x/wk
- Incidence rate of running related injuries: 18.2-92.4%
- Prevalence rate ranged from 6.8-59 injuries per 1,000 hours of running.

Common Running Injuries
A 2 year study of running injuries at University of British Columbia.
- Patellofemoral pain syndrome
- ITB syndrome
- Plantar fasciitis
- Meniscal injuries
- Tibial stress syndrome
- Patellar tendinitis
- Achilles tendinitis (Taunton et al., 2002)

Where were the most common running injuries? (Taunton et al., 2002)
- Knee 42%
- Foot/Ankle 17%
- Lower leg 13%
- Hip/Pelvis 11%
- Achilles 6%
Why should we have an interest in running injuries? (Dhound et al., 2012)
- In a group of 52 Harvard Cross Country runners, 65% were rearfoot strikers and 31% were forefoot.
- 74% of the runners suffered a moderate or severe injury that year!
- The rearfoot strikers had twice as many stress injuries.
- Most common: Medial Tibial Stress Syndrome, ITB Syndrome, PFP Syndrome, Achilles Tendinopathy

What do we know about MIDDLE SCHOOL aged running injuries? (Beach & Rauh, 2014)
- CROSS COUNTRY
  - Girls: 3rd overall injury rate, 11/1,000 AE (athletic exposures)
  - Girls: More injuries than boys
    - Boys n=8,078
    - Girls n=5,960

What do we know about MIDDLE SCHOOL aged running injuries? (Beach & Rauh, 2014)
- TRACK
  - Girls: 2nd overall injury rate behind football
    - 12/1,000 AE
  - Girls: 3rd Time-loss injuries 5/1,000 AE
  - A 20 year Multisport evaluation at Punahou School
What do we know about HIGH SCHOOL running injuries?
(Beachy et al., 1997)

In a 1997 8-year longitudinal study @ Punahoe HS 32 sports 11,184 injuries reported all sports. CROSS COUNTRY Girls and boys XC injury rate was 10th of the 32 sports! Girls: Low rate of day-lost injuries at 21%

What do we know about HIGH SCHOOL running injuries?
(Beachy et al., 1997)

TRACK Girls: Highest # of student athletes per year 191/year. Girls: 2nd highest # of injuries behind football with 1120 total injuries over the 8 year period.

TRACK Boys: 5th Highest # of injuries with 820 total injuries over the 8 year period. Boys: Highest # of Days-lost injuries of all sports at 342 day-lost injuries or 42% of all boys track injuries.

The big question? Will changing a runner’s gait pattern preventatively, prevent injury?

“...in the absence of symptoms, as would be the case for injury prevention, compliance may be limited.”
(Heiderscheit, 2011, JOSPT editorial)
Are there interventions for preventing lower limb soft-tissue running injuries?

In 2011, Yeung, Yeung and Gillespie did a COCHRANE REVIEW and found 29 trials that included 30,252 participants and the results were disappointing.

1. No evidence stretching, or regimen of strengthening, flexibility & coordination reduced injuries.
2. Patella Femoral braces appear to be effective for preventing anterior knee pain.
3. Custom insoles may be more effective than no insoles.

Are there strategies to enable clinicians to improve exercise prescription and gait retraining for running-related injuries?

YES!

A simple 10% increase in step rate reduces energy absorption at the hip during loading response and had a 14% reduction in piriformis force and 10% reduction in gluteal muscle force! (Lenhart, Thelen, Hiderscheit, 2014, JOSPT, n=30, Univ. Wisc., 90%, 100%, 110% step rate)

Is there evidence that sagittal plane kinematic measurements can be used to estimate kinetic forces during running? (Wille, Lenhart, Want, Thelen, Hiderscheit, 2014, JOSPT)

YES!

HOW?

1. Increase step rate.
2. Avoid heel strike at initial contact.
3. Alter limb position at initial contact.
4. Reduce Center of Mass Vertical Excursion (bounce)
Can runners be instructed to alter their heel strike pattern to decrease Patellofemoral pain? (Cheung & Davis, 2011, JOSPT)

**YES!**
In a case series of 3 female runners with rearfoot strike pattern who received 8 sessions of audio feedback to decrease heel strike and shorten their stride length had a reduction in PFP!

Can the simple instruction of increasing step rate reduce patellofemoral magnitude and rate of loading? (Lenhart, Thoden Wilig, Chumanov, Heiderscheit, 2014)

**YES!**
How? Audible metronome and watch or GPS to monitor pace!
*A 10% increase step rate = 11% decrease in peak load.*

KNEE IS MORE EXTENDED AT MID STANCE PEAK KNEE FLEXION ANGLE SO A DECREASE IN PFJ COMRESSIVE LOAD!

Running Video Analysis

- What should I do to become better prepared to identify running injuries and how to manage them?
  - Plan your strategies
  - Read literature
  - Attend courses
  - Invest in needed technology
  - Become a runner yourself
  - GO FOR IT!
Erica
- 28 y/o female
- At time of video analysis, L posterior lateral knee, posterior knee, and IT band insertion pain; 0/10 rest, 5/10 worst, described as an ache starting 2 miles into run
- In 2015, she was running 2 miles 3x/week, ran 5K 6/1/15, stopped running and worked out legs, core for an hour 3x/week
- 1 month prior to video analysis, started running again, at 2 miles would experience knee pain

John
- 46 y/o male
- Ran the Akron Marathon in September 2015
- Distal R Achilles pain began during training July 2015
- Last time running before visiting our office was 11/11/15
- Since not running he has been cross training – swimming, stepper, rower, bike, etc.

Challis
- 20 y/o female
- Collegiate cross country and track runner at Slippery Rock University
- 6:41 mile
- Fractured sacrum August 2014
- Pain in right lower thoracic/upper abdomen June 2015
- Pain in sacrum December 2015
Arden

- 69 y/o male
- Pain started approximately a month and a half prior to the video analysis
- R greater trochanter pain 2/10, was a 10/10 and was unable to climb stairs
- Received 2 cortisone shots prior to seeking physical therapy care

Is there a need in your community or at your practice for exercise classes or a race series?

How to do a needs assessment, quick and easy!

- Emailed to 573 former patients, exercisers and race participants.
- Posted on Facebook and Twitter
- Respondents: 143
- Response rate: 25%
Survey monkey results

<table>
<thead>
<tr>
<th>Age 41-60</th>
<th>53%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/Female</td>
<td>25%/75%</td>
</tr>
<tr>
<td>Regularly exercise Yes/No</td>
<td>71%/29%</td>
</tr>
<tr>
<td>Where? Home/Gym/ARHS</td>
<td>75%/37%/16%</td>
</tr>
</tbody>
</table>

If you were to participate in a class at ARHS, what would you choose?

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoga</td>
<td>45%</td>
</tr>
<tr>
<td>Stretch &amp; Tone</td>
<td>32%</td>
</tr>
<tr>
<td>Zumba</td>
<td>30%</td>
</tr>
<tr>
<td>Mixed Fit/Machines/Bands/Drills</td>
<td>24%</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>23%</td>
</tr>
<tr>
<td>Cross Fit type of exercises</td>
<td>20%</td>
</tr>
</tbody>
</table>

Q13 If you were to work out for one hour, please rate the equipment on how often you would personally use it.
Calendar

ARHS Revenue Generated and Number of Exercisers per Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Exercisers</th>
<th>Revenue per Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2,316</td>
<td>$38.81</td>
</tr>
<tr>
<td>2013</td>
<td>1,977</td>
<td>$34.63</td>
</tr>
<tr>
<td>2014</td>
<td>1,401</td>
<td>$32.80</td>
</tr>
<tr>
<td>2015</td>
<td>1,365</td>
<td>$26.73</td>
</tr>
<tr>
<td>Total</td>
<td>7,059</td>
<td>$33.24</td>
</tr>
</tbody>
</table>

Opportunities Available for Therapists Interested in Working with Walkers / Runners

- Develop Race Series
- Co-sponsor Races
- Running / Walking / Injury Prevention / Performance Clinics
- School Involvement
- Running Analyses
Race Series

- **Potato Stomp**
  - No. of years: 16
  - Total Runners: 4,429
    - Avg. per year: 277
  - Former patients: No way to determine

- **Turkey Trot**
  - No. of years: 16
  - Total Runners: 1053
    - Avg. per race: 66 (2015: 135!)
  - Former patients: 39%

- **Chili Bowl**
  - No. of years: 8
  - Total runners: 375
    - Avg. per race: 47
  - Former patients: 39%
Cinco de Mayo
- No. of years: 1
- Total runners: 50
- % past pts: 34%
- Profit: $320
  - total income: $620
  - supplies: $300

New Year’s Day
- No. of years: 6
- Total Runners: 241
  - Avg. per year: 40
- Former patients: 34%

Race Series Exercise Adherence 2011-2015 (ARHS Data)

<table>
<thead>
<tr>
<th>Year</th>
<th># Participants</th>
<th># Patients</th>
<th>Patients/Participants</th>
<th># Exercisers</th>
<th>Exercisers/Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>159</td>
<td>67</td>
<td>0.42</td>
<td>38</td>
<td>0.24</td>
</tr>
<tr>
<td>2012</td>
<td>346</td>
<td>139</td>
<td>0.40</td>
<td>79</td>
<td>0.23</td>
</tr>
<tr>
<td>2013</td>
<td>187</td>
<td>80</td>
<td>0.36</td>
<td>43</td>
<td>0.26</td>
</tr>
<tr>
<td>2014</td>
<td>126</td>
<td>64</td>
<td>0.51</td>
<td>41</td>
<td>0.33</td>
</tr>
<tr>
<td>2015</td>
<td>238</td>
<td>77</td>
<td>0.32</td>
<td>34</td>
<td>0.14</td>
</tr>
<tr>
<td>Total</td>
<td>1036</td>
<td>407</td>
<td>0.39</td>
<td>235</td>
<td>0.23</td>
</tr>
</tbody>
</table>
What is a Mini Clinic?
- Running performance
- Balance & walking for seniors
- Community invited
- Customer appreciation day
  - 20 minute sessions
    - Running 101
    - Stretching
    - Dynamic Drills
    - Proper Form

Mini Clinic for Walking
Population
- Balance Drills
- Falls Prevention
- Stretching
- Agility Drills
- Strengthening
- Posture
- Shoe wear
Community Walking Program

- Local School
- Winter months
- 1 hour 2 mornings / week
- Early morning before students arrive
- Great PR – local school newsletter, school website, local paper, email list
- Present 1 day / week to answer questions, take BP, etc

Group Runs

- Meet at your clinic
- Email lists
- Create social support
- Potential referral sources
- Training preparation

IN CONCLUSION! (Go Browns)
“The doctor of the future will give no medicine, but will instruct his patient in the care of the human frame, in diet and in the cause and prevention of disease.” (Thomas Edison, unknown)

Reference List


