Female Athlete Triad

Kat Hilgeman, ATC, PES
Froedtert Sports Medicine Center

Why the Female Athlete Triad?

- Eating disorders found in 31% of elite female athletes in "thin-build" sports compared to 5.5% of the control population
- 25% of female elite athletes in endurance sports, aesthetic sports, and weight-class sports had clinical eating disorders compared to 9% of the general population
- Recent increase in the number of student – athletes being diagnosed with the Triad when seeking diagnosis for one or multiple sports related injuries
  - Increase in # of stress reactions & fractures this past Fall

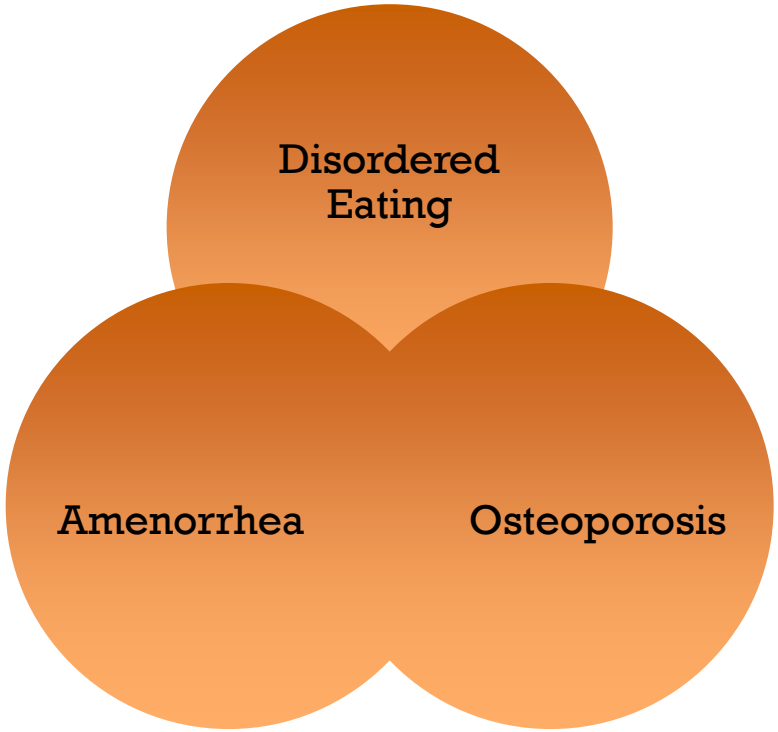
Why the Female Athlete Triad?

- Research regarding the Female Athlete Triad is being done at DSHA
  - Collaboration between a DSHA student, Medical College of Wisconsin/Froedtert Health Physicians, and the DSHA student body
  - Direct correlation between national prevalence and prevalence with the current students here at DHSA

What is the Female Athlete Triad?

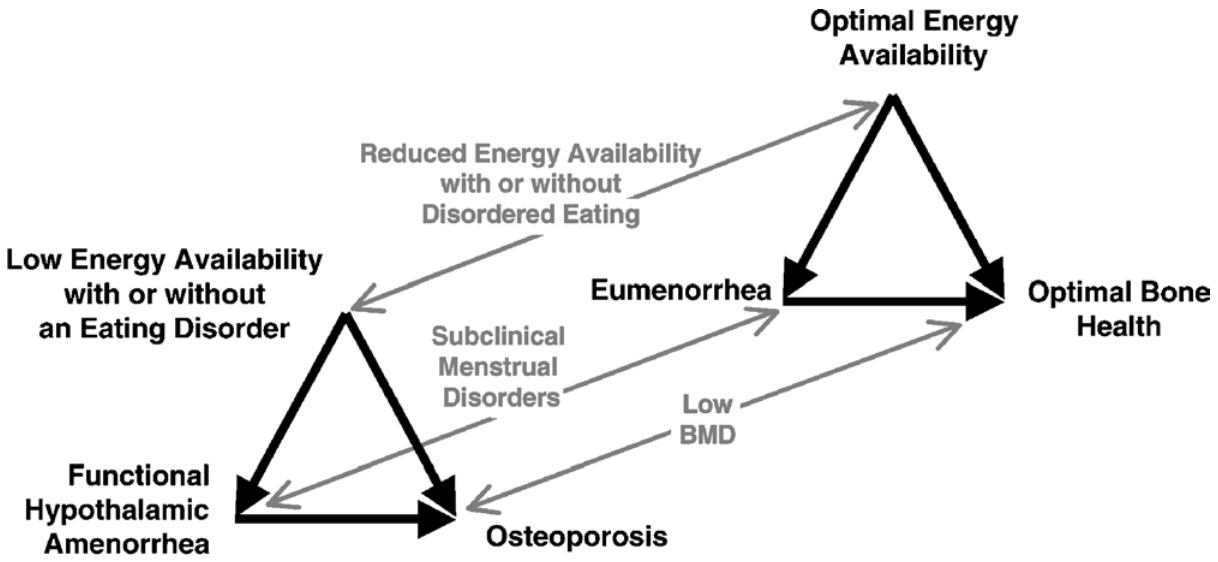
- Describes 3 interrelated health problems commonly seen in females/female athletes
- First defined in 1992 by the American College of Sports Medicine (ACSM)
- The Triad looks at the connection between:
  1. Energy availability
  2. Menstrual function
  3. Bone mineral density
- Deficiencies in these areas simultaneously can result in physical signs, symptoms, and diagnosis
- A deficiency or imbalance between energy availability, menstrual function, and bone mineral density appear clinically as:
  - Disordered eating
  - Amenorrhea
  - Osteoporosis

What is the Female Athlete Triad?



- Clinical manifestations include:
  1. Disordered eating habits
  2. Loss of menstrual period (amenorrhea)
  3. Weak bones (osteoporosis)

What is the Female Athlete Triad?



- Goal is for every females physical condition to coincide with the upper right corner

- This represents a healthy athlete who adjusts her dietary energy intake to compensate for exercise energy expenditure

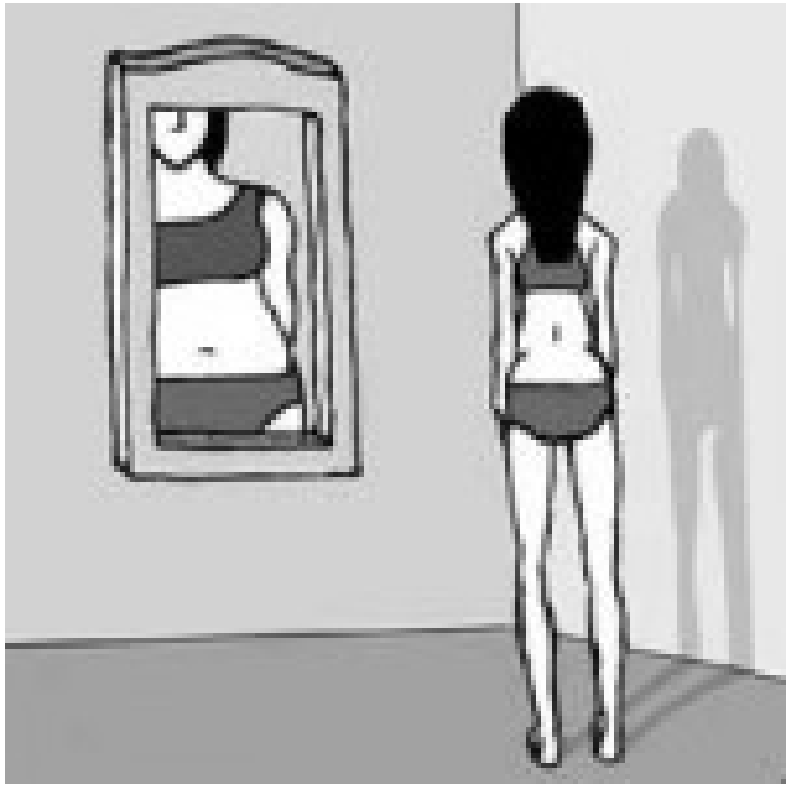
(1) Disordered Eating Habits

- **Disordered Eating Habits** – various abnormal eating behaviors, including restricted eating, fasting, skipping meals frequently, diet pills, diuretics, laxatives, enemas, overeating, binge eating & purging (vomiting)

- **Eating Disorder** – clinical mental disorder defined by the DSM-IV and characterized by abnormal eating behaviors, an irrational fear of gaining weight, and false beliefs about eating, weight, and shape

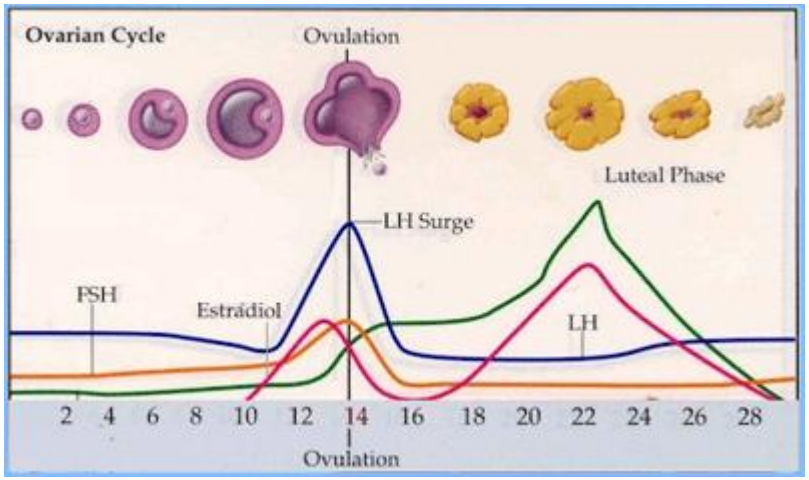
(1) Disordered Eating Habits

- Disordered Eating Habits
  - Fasting
  - Binge- eating
  - Purging
  - Diet pills
  - Laxatives
  - Diuretics
  - Enemas
- Eating Disorders
  - Anorexia Nervosa
  - Bulimia Nervosa
  - Eating Disorder Not Otherwise Specified (ED-NOS)



(2) Loss of Menstrual Period

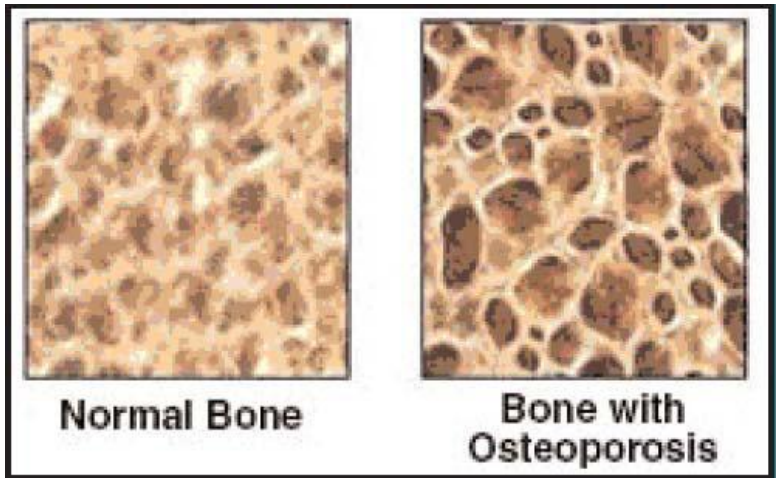
- **Eumenorrhea** –menstrual cycles at intervals near the medial interval for young adult women; reoccurring at intervals approximately 28 days with standard deviation of 7 days



- **Amenorrhea** – absence of menstrual cycle for more than 90 days
  - **Primary amenorrhea** – delay in the age of first period (15 years)
  - **Secondary amenorrhea** – absence of menstrual cycle > 3 months after having initial period

(3) Osteoporosis

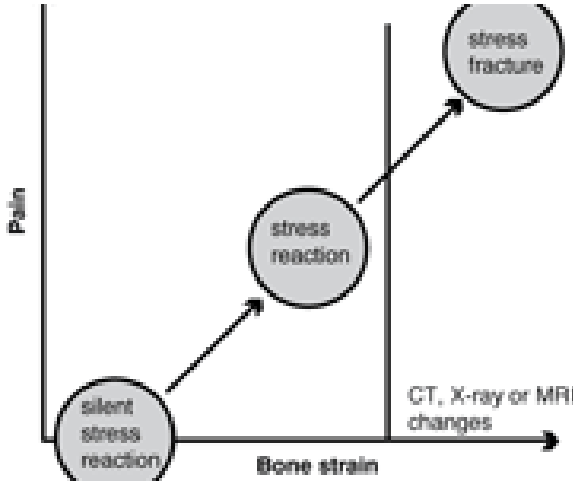
- **Osteoporosis** – skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture



- Bone strength & risk of fracture depend on the density & internal structure of bone mineral and on the quality of bone protein (which explains why one person may suffer fractures while another with the same BMD does not)
- Not always caused by accelerated bone mineral loss in adulthood
  - May also be caused by not accumulating optimal BMD during childhood & adolescence

(3) Osteoporosis

- Results of Osteoporosis:
  - Stress reactions
  - Stress fracture
  - Fractures
  - Bone loss
  - Decreased Bone Density

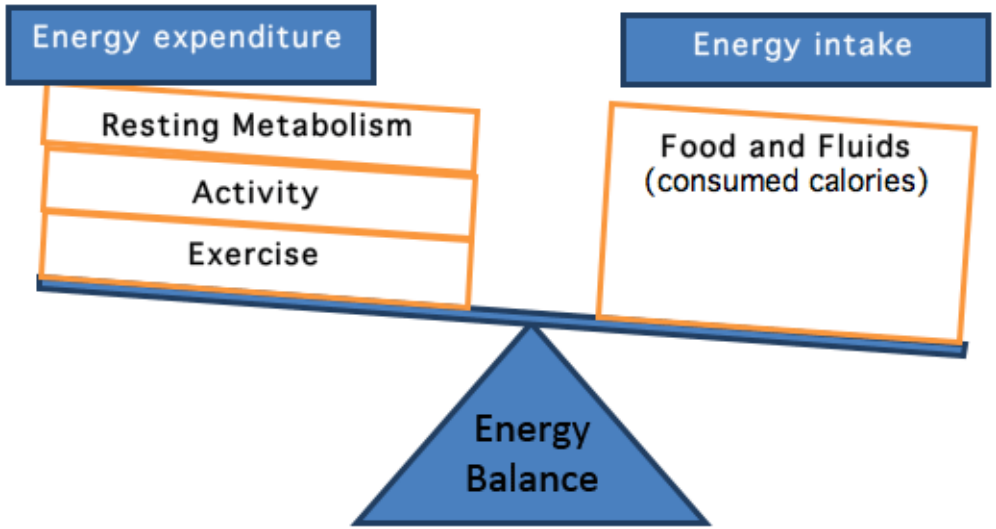


- Onset of amenorrhea does not cause osteoporosis immediately, but skeletal demineralization begins moving her BMD in that direction

- Similarly, resuming regular menses does not immediately restore optimal bone health, but mineral accumulation begin to improve her BMD

Energy Balance and the Triad

- Energy availability = dietary energy intake minus exercise energy expenditure
- Low energy availability appears to be the factor that impairs reproductive and skeletal health in the Triad
  - may be unintentional, intentional or psychopathological
- First aim of treatment in any triad component is to increase energy availability by increasing intake or reducing activity

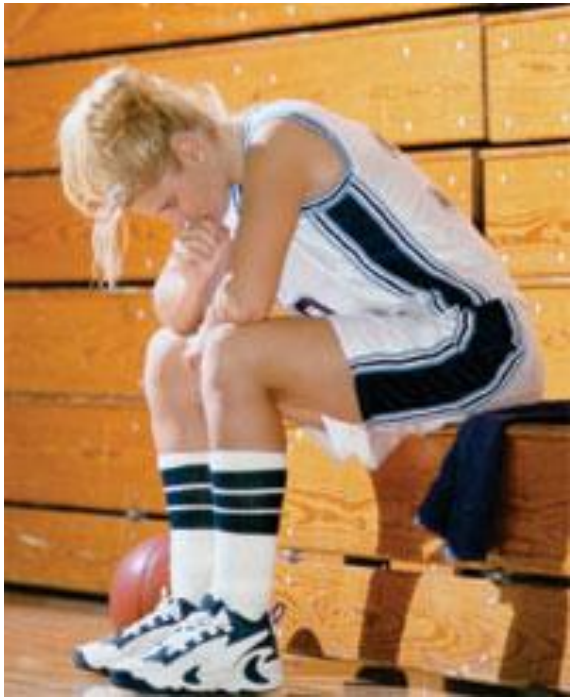


Signs & Symptoms of the Triad

- Disordered eating
  - Restrictive dieting
  - Binge eating
  - Induced vomiting
  - Laxative use
  - Excessive exercising
- Eating less than needed in an effort to improve performance or physical appearance
- Weight Loss
- Cold hands and feet
- Dry skin
- Hair loss
- Always feeling tired and fatigued
- Problems sleeping

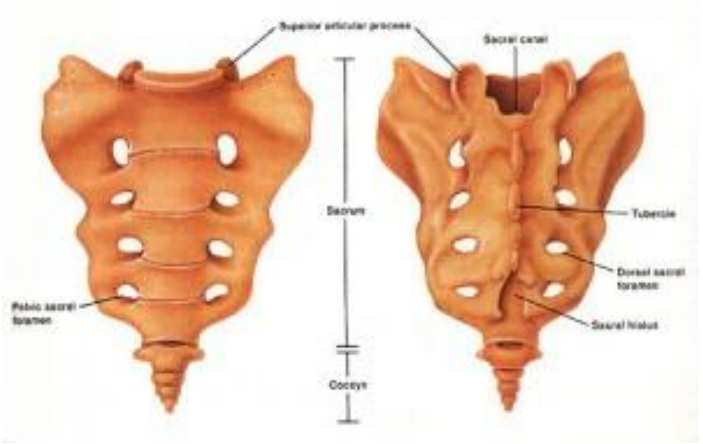
Signs & Symptoms of the Triad

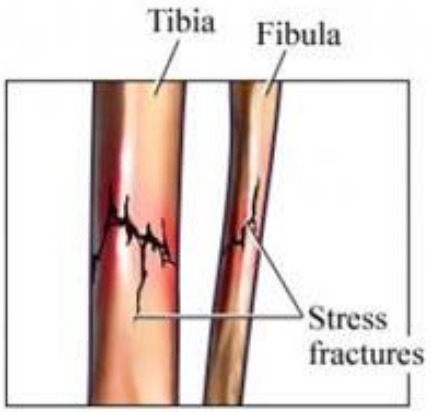
- Irregular or absent menstrual cycles
- Stress fractures and frequent or recurrent injuries
- Emotional components
  - Depression
  - Decreased concentration
  - Mood changes



Signs & Symptoms of the Triad

- Athletes, friends, parents & coaches need to be aware that these signs & symptoms are NOT HEALTHY:
  - Amenorrhea
  - Irregular menses
  - Disordered eating
  - Excessive exercise & training
  - Frequent & reoccurring injuries
  - Slow to heal injuries
  - Stress fractures
    - Sacral (Hip region)
    - Femoral (Thigh)
    - Tibial (Shin)
    - Metatarsals (Foot)





What are the risk factors?

- Greatest risk for low energy availability are those who:
  - Restrict dietary energy intake
  - Exercise for prolonged periods
  - Vegetarian
  - Limit the types of food they will eat

What are the risk factors?

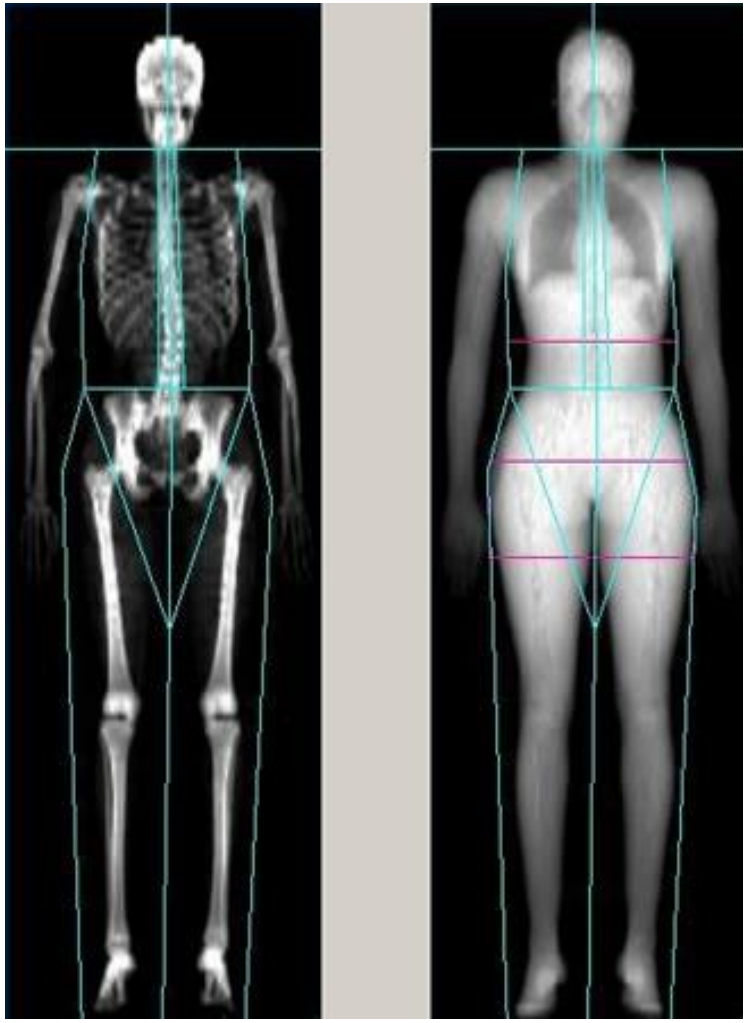
- Dieting at an early age
- Participating in sports focused on thin body size & shape
- Sports with revealing uniforms
- Sports with weight classes
- Notion that loss of weight or body fat directly enhances sports performance
- Perfectionist personality traits
- Decreased eating with family and friends
- False but common beliefs that amenorrhea, excessive exercise, and weight loss in athletes are normal and desirable

How is it diagnosed?

- Athletes with one component of the Triad should be assessed for the others
- Consultation with a physician experienced in treating female athletes or a reproductive medicine specialist is recommended & should be assessed for:
  - Information on energy intake, dietary practices, weight fluctuations, eating behaviors, and exercise energy expenditure
  - Signs and symptoms of an eating disorder, height, weight, and vital signs
  - Bradycardia & orthostatic hypotension are commonly seen
  - Other findings include: cold/discolored hands and feet, hypercarotenemia, lanugo hair, and parotid gland enlargement
  - EKG

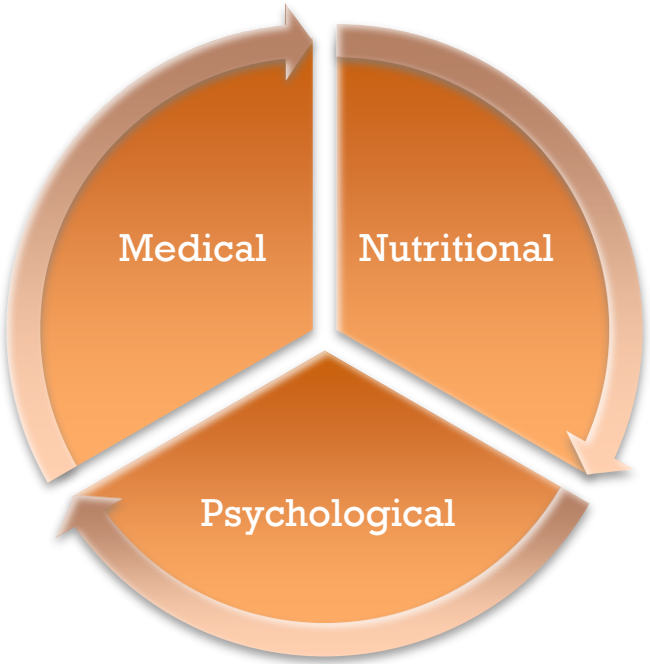
How is it diagnosed?

- A history of estrogen disorders, disordered eating or eating disorders for a cumulative total of 6 months or more, and/or a history of stress fractures or fractures from minimal trauma warrants BMD assessment by dual-energy X-ray absorptiometry (DEXA)
- Reevaluation is recommended in 12 months in those with persistent Triad disorders.



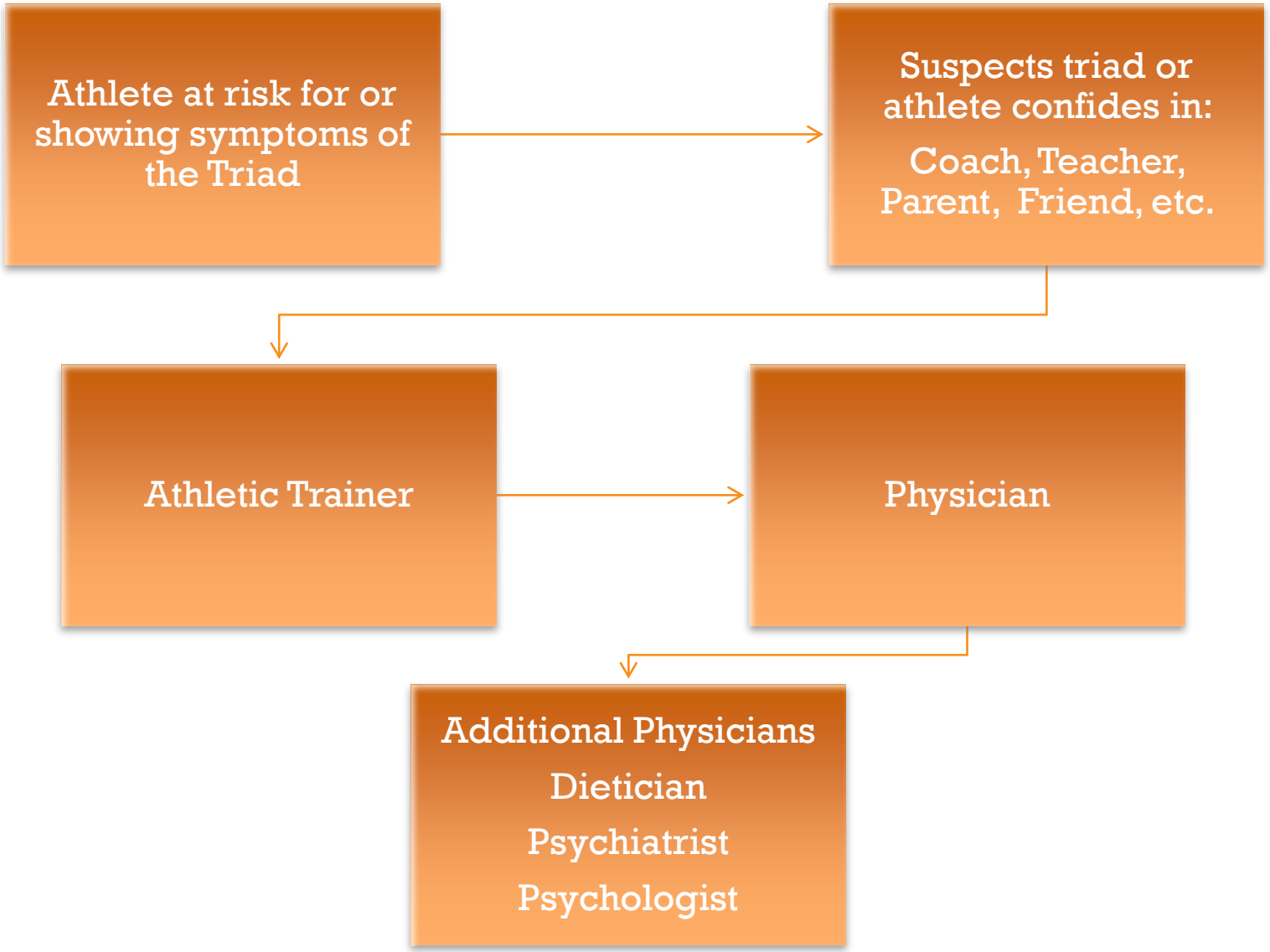
How is it treated?

- Multi-disciplinary approach
- Interventions include:
  - Medical
  - Nutritional
  - Psychological



- Counseling in proper nutrition for the amount of energy expended and modification in activity and training
- Normal menstruation is a goal

Seeking Treatment



Short Term Consequences of the Triad

- Cardiovascular, endocrine, reproductive, skeletal, gastrointestinal, renal and central nervous system complications
- Nutritional deficiencies and fluid electrolyte imbalances
  - Impaired performance
  - Impaired growth
  - Impaired mental functioning
  - Increase risk of injury

Short Term Consequences of the Triad

- Amenorrheic women are inertial, due to absence of ovarian follicular development, ovulation, and luteal functioning
- BMD declines as the number of missed menstrual cycles accumulates
- The loss of BMD may not be fully reversible
- Stress fractures occur more commonly in physically active women with menstrual irregularities and/or low BMD
- The relative risk for stress fracture 2-4x greater in amenorrheic than eumenorrheic athletes

Long Term Consequences of the Triad

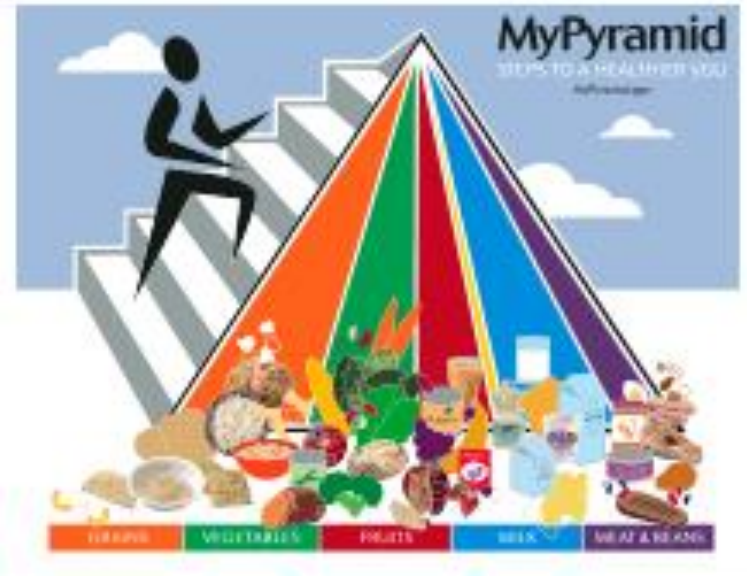
- Loss of reproductive functioning
- Increase in healing time for injuries
- Serious medical conditions
  - Dehydration
  - Starvation
  - Death

How can the Triad be prevented?

- Nutritional, medical, & psychological education related to healthy eating and nutrition for life-long healthy lifestyle
- Encouraging athletes to select friends and role models with healthy body images and eating habits
- Athletes should keep track of their periods to monitor days between cycles
- Meals and snacks should not be skipped – especially during training seasons
- Athletes should bring snacks for practice and to carry around during the day
- Foods containing protein, fat and carbohydrates are healthy choices
- Athlete should visit a dietician if concerns arise about healthy food choices

How can the Triad be prevented?

- Emphasis should be placed on optimizing energy availability
- Special attention should also be given to maximizing bone mineral accrual in pediatric and adolescent athletes and to maintaining bone health throughout life
- Children, adolescents, and young adults should be counseled on nutritional requirements for their age, including calcium and vitamin D, and on the benefits of regular weight bearing exercise for bone health



What can coaches do?

- Encourage healthy habits
  - Promote good nutrition
  - Encourage substantial caloric intake
  - Emphasize the importance of rest/recovery days ~2 days/week
  - Remind your athletes that eating is an important part of successful training and performance
  - Focus on health and a positive body image, do NOT focus on body weight
- Alternate intense, difficult practices & workouts with less intense, lighter ones
- Support athletes throughout their training and competition, as well as during their everyday life
- Talk with the athletic trainer if you suspect an athlete has symptoms of the Female Athlete Triad
- If one of your athletes is diagnosed with the Triad, be understanding and willing to allow alternative practices and participation for that individual – alienating them from the team can often make the problem worse

What can coaches do?

- Utilize available resources –athletic trainers, nutritionists, counselors, and physicians

  - *DSHA Affiliated Health Care Providers through Froedtert & Medical College of Wisconsin*
    - **Athletic Trainer –** Kat Hilgeman, ATC, PES
    - **Nutritionist –** Nicole Fasules, RD, CD, CSSD
    - **Team Physicians –** Dr. Kate Temme & Dr. Anne Z. Hoch*

    ** Director of the Women's Sports Medicine Program and professor of orthopedic surgery at MCW as well as a published researcher in the Female Athlete Triad*

Further Information

- Froedtert & the Medical College of Wisconsin
  - http://www.froedtert.com/SpecialtyAreas/WomenSportsMedicineProgram/Highlights/WomensSportsMedicineProgramHighlights.htm
- WIAA
  - http://www.wiaawi.org/index.php?id=642
- NCAA Coaches Handbook
  - http://www.ncaa.org/wps/wcm/connect/2db7d8004e0db26bac18fc1ad6fc8b25/female_athlete_triad.pdf?MOD=AJPERES&CACHEID=2db7d8004e0db26bac18fc1ad6fc8b25
- Female Athlete Triad Coalition
  - http://www.femaleathletetriad.org/faces-of-the-triad/

+

Thank You