

Erectile Dysfunction

MLK Internal Med Didactics 2023

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Outline

1. Definition
2. Epidemiology
3. Pathophysiology
4. Workup
5. Medical Treatment
6. Surgical Treatment



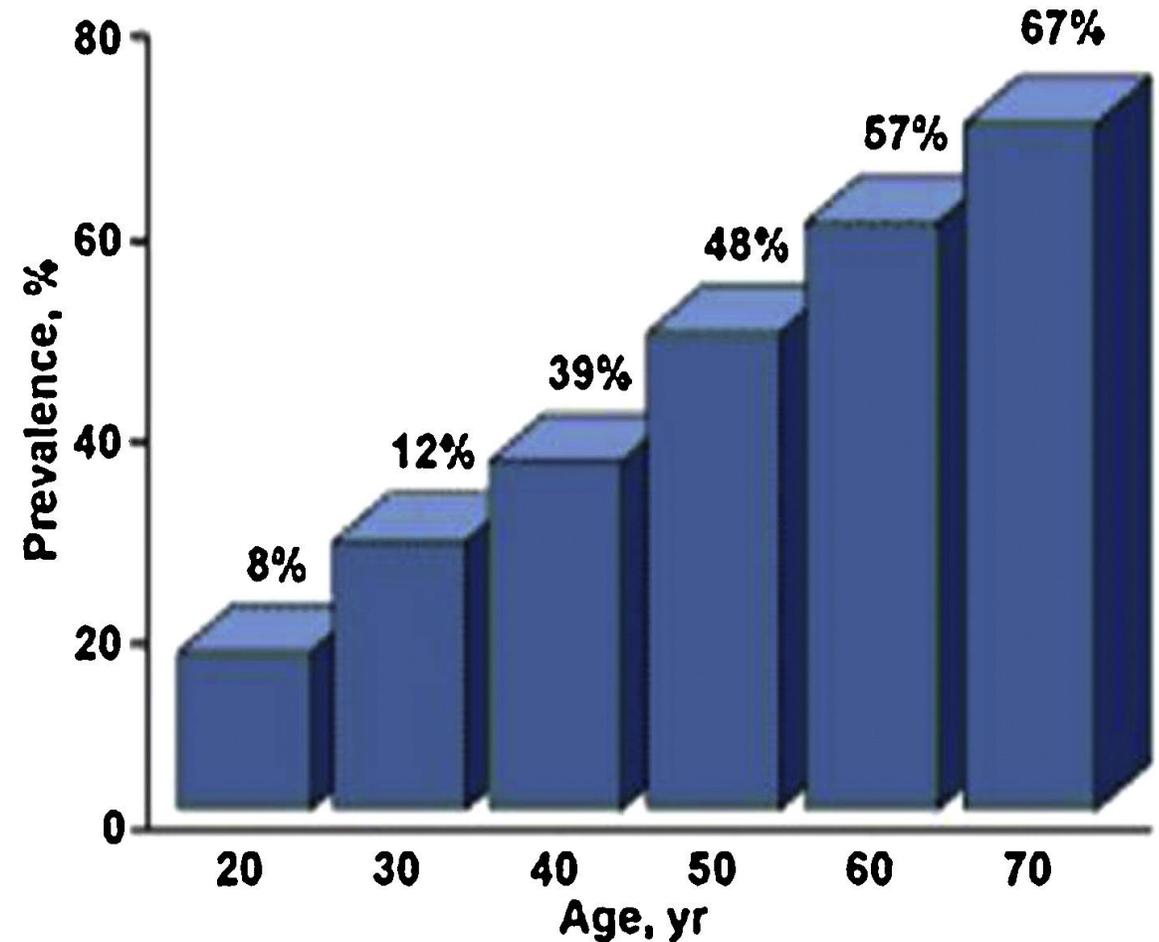
Definition

Erectile Dysfunction: The inability to attain and/or maintain penile erection sufficient for satisfactory sexual performance¹

Epidemiology

ED is common!

- Worldwide prevalence ~20%¹
- Prevalence increases with age²



ED Pathophysiology

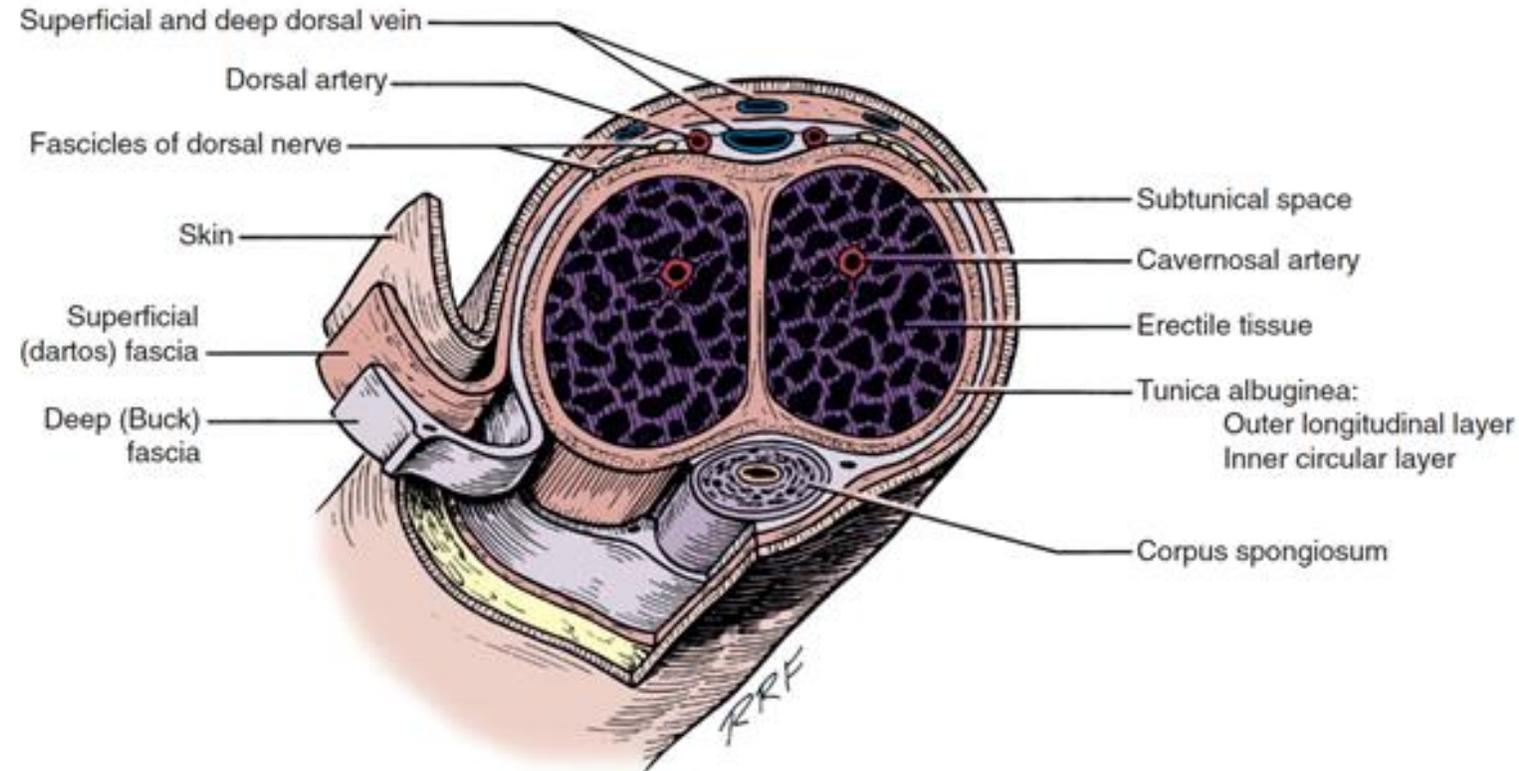
Four main categories of ED:

1. **Vascular**
2. Neurologic
3. Hormonal
4. Psychogenic

ED Pathophysiology - Vascular

- Vascular Causes of ED

- Hypertension
- Hyperlipidemia
- Diabetes mellitus
- Obesity
- Tobacco use
- Metabolic syndrome



ED Pathophysiology

Four main categories of ED:

1. Vascular
2. **Neurologic**
3. Hormonal
4. Psychogenic

ED Pathophysiology - Neurologic

- Neurogenic ED:
 - Injury to **cavernous nerve**
 - Pelvic surgery (radical prostatectomy)
 - Diabetes
 - Damage to spinal nerve roots: **S2-4**

ED Pathophysiology

Four main categories of ED:

1. Vascular
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3. **Hormonal**
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ED Pathophysiology

Hormonal causes of ED:

- **Hypogonadism**
- Hyperprolactinemia
- Diabetes
- Cushing syndrome

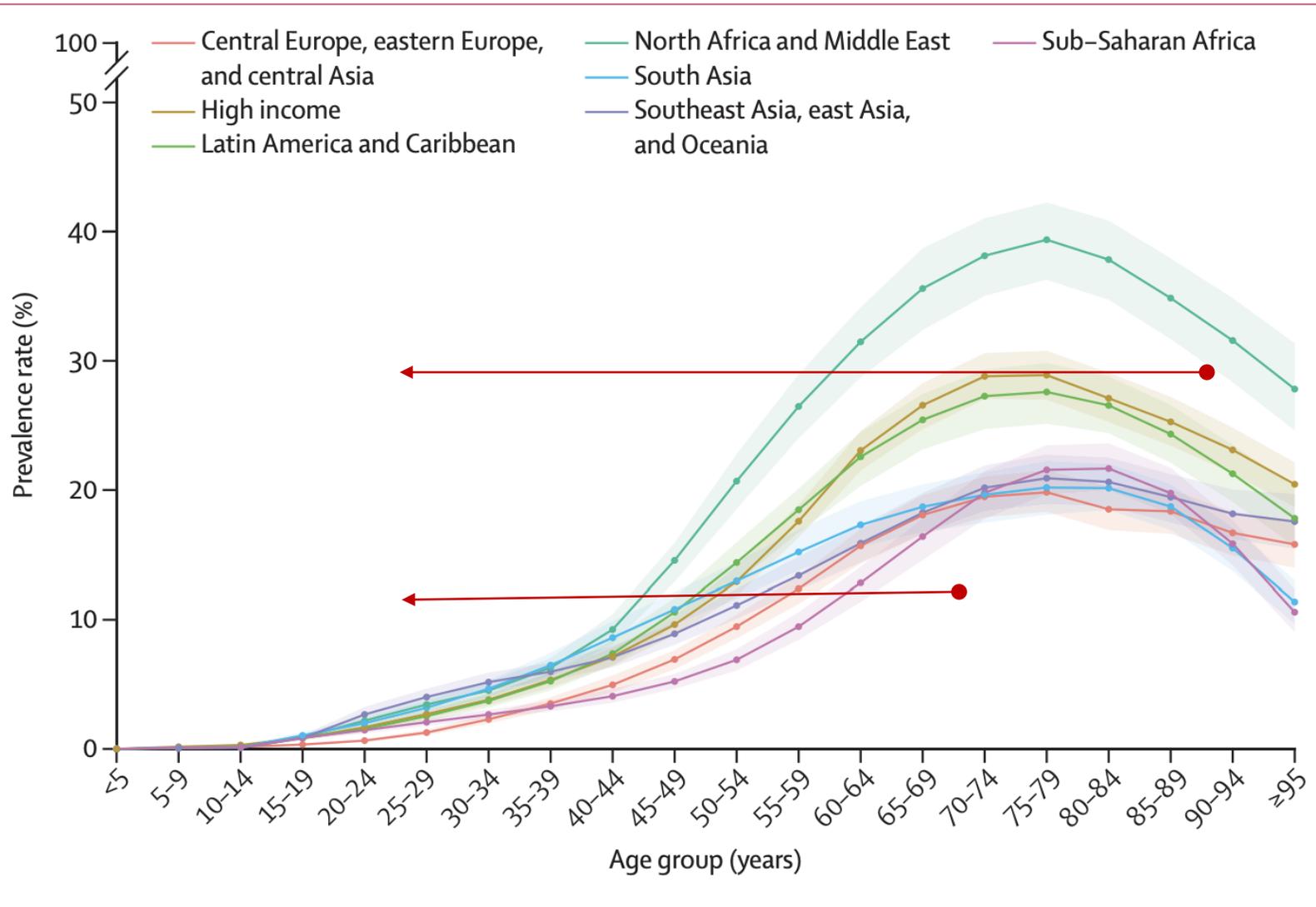
Psychogenic ED

- Anxiety, depression, or partner-related difficulties
- Sudden-onset of symptoms
- Situational
- No issues with solo-stimulation vs partnered intimacy
- Good quality spontaneous morning erections

ED Pathophysiology - Vascular

- ED as harbinger of cardiovascular disease
 - ED often pre-dates diagnosis of clinically-significant vascular disease by 2-3 years¹
 - Men < 40 yrs with ED: **7x increase in cardiovascular events** than same men without ED¹

Diabetes Prevalence

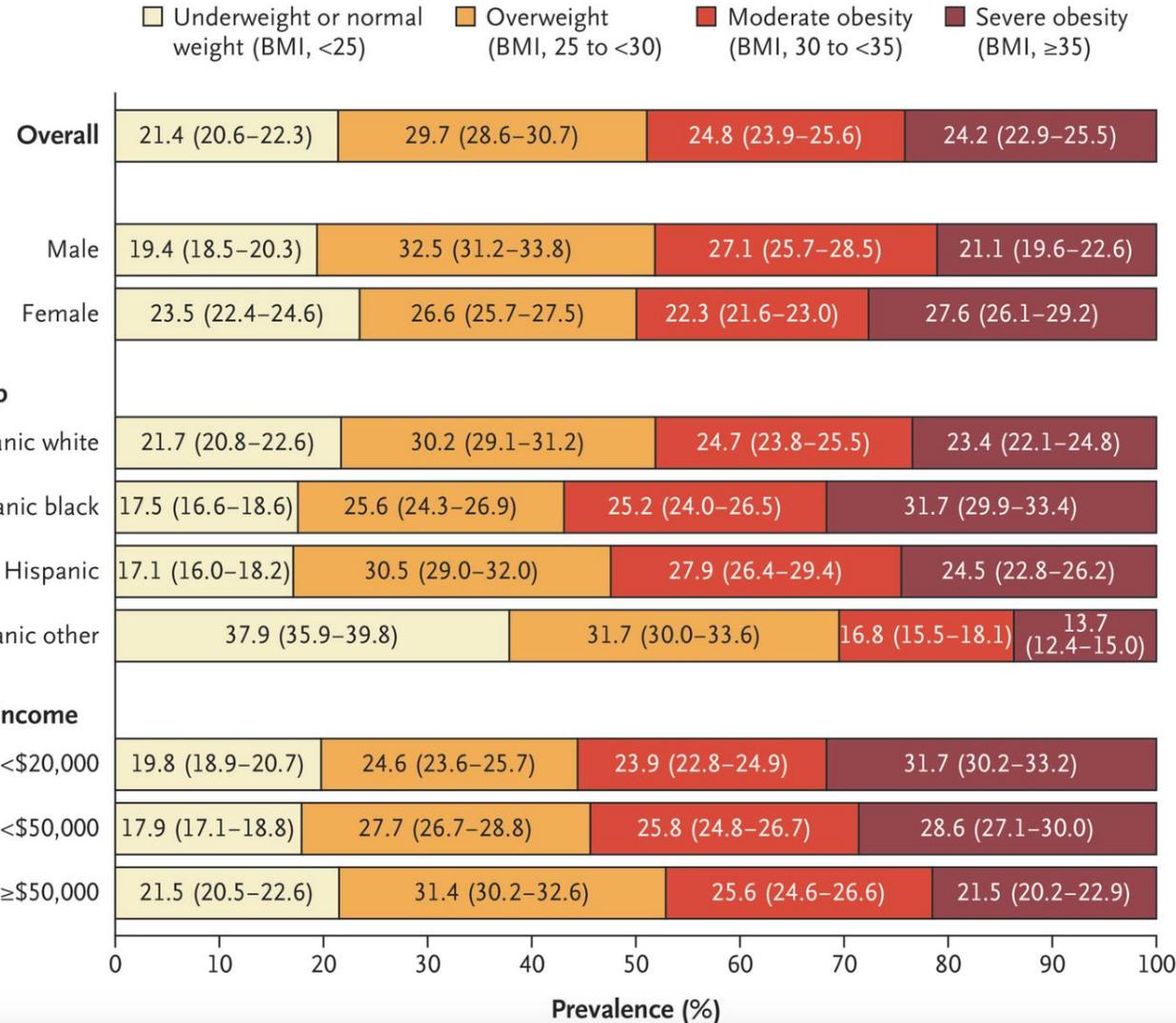


529 million people

38.4 million US

Prevalence 6.1%

Obesity Prevalence, 2030 estimates



Obesity is expected to continue worsening

Health inequities expected to contribute

Medical causes of ED

Table 3. Medications and Substances That May Cause or Contribute to Erectile Dysfunction

Alcohol, nicotine, and illicit drugs (e.g., amphetamines, barbiturates, cocaine, marijuana, opiates)

Analgesics (e.g., opiates)

Anticonvulsants (e.g., phenobarbital, phenytoin [Dilantin])

Antidepressants (e.g., lithium, monoamine oxidase inhibitors, selective serotonin reuptake inhibitors, serotonin-norepinephrine reuptake inhibitors, tricyclic antidepressants)

Antihistamines (e.g., dimenhydrinate, diphenhydramine [Benadryl], hydroxyzine, meclizine [Antivert], promethazine)

Antihypertensives (e.g., alpha blockers, beta blockers, calcium channel blockers, clonidine, methyldopa, reserpine)

Antiparkinson agents (e.g., bromocriptine [Parlodel], levodopa, trihexyphenidyl)

Antipsychotics (e.g., chlorpromazine, haloperidol, pimozide [Orap], thioridazine, thiothixene)

Cardiovascular agents (e.g., digoxin, disopyramide [Norpace], gemfibrozil [Lopid])

Cytotoxic agents (e.g., methotrexate)

Diuretics (e.g., spironolactone, thiazides)

Hormones and hormone-active agents (e.g., 5-alpha-reductase inhibitors, androgen receptor blockers, androgen synthesis inhibitors, corticosteroids, estrogens, gonadotropin-releasing hormone analogs, progesterones)

Immunomodulators (e.g., interferon alfa)

Tranquilizers (e.g., benzodiazepines)

ED Pathophysiology – Psychogenic

- Psychogenic ED
 - Anxiety, depression, or partner-related difficulties
 - Sudden-onset of symptoms
 - Situational
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ED Pathophysiology – Psychogenic

Important to assess for other etiologies beside “psychogenic”!

Direct-To-Consumer Internet Prescription Platforms Overlook Crucial Pathology Found During Traditional Office Evaluation of Young Men With Erectile Dysfunction

Robert H. Shahinyan, Arash Amighi, Alson N. Carey, Dar A. Yoffe, Devyn C. Hodge, Matthew E. Pollard, Justin J. Nork, Jesse N. Mills, and Sriram V. Eleswarapu

Urology 2020

- Patients <40 years seen for ED at UCLA Men’s Clinic, 2016-2019
 - n = 388 patients
 - Mean age: 29.5 years
 - Comorbidities:
 - **15% obesity**
 - **20% prediabetes or diabetes**
 - **54% dyslipidemia**
 - **20% hypogonadism**

Workup for ED

Evaluation of ED

- History

- Onset, severity, context, etc
- Psychosexual history
- Questionnaires
 - Single question assessment
 - International index of erectile function (IIEF-5) / Sexual Health Inventory for Men (SHIM)
- PMHx/PSHx
 - Prior prostate cancer treatment
 - DM

- Exam

- Vital signs, BMI
- GU: secondary sex characteristics & testis size

- Tests:

- Testosterone level
- Hgb A1c, lipids
- Rarely - Intracavernosal Injection +/- Penile Duplex Doppler US

ED Questionnaires

Table 1. Single-Question Assessment of Erectile Dysfunction

Impotence means not being able to get and keep an erection that is rigid enough for satisfactory sexual activity. How would you describe yourself?

- A. Not impotent: always able to get and keep an erection good enough for sexual intercourse.
- B. Minimally impotent: usually able to get and keep an erection good enough for sexual intercourse.
- C. Moderately impotent: sometimes able to get and keep an erection good enough for sexual intercourse.
- D. Completely impotent: never able to get and keep an erection good enough for sexual intercourse.

Information from reference 4.

Am Fam Physician 2016

The IIEF-5 Questionnaire (SHIM)

Please encircle the response that best describes you for the following five questions:

Over the past 6 months:					
1. How do you rate your confidence that you could get and keep an erection?	Very low 1	Low 2	Moderate 3	High 4	Very high 5
2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5
3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated your partner?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5
4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse?	Extremely difficult 1	Very difficult 2	Difficult 3	Slightly difficult 4	Not difficult 5
5. When you attempted sexual intercourse, how often was it satisfactory for you?	Almost never or never 1	A few times (much less than half the time) 2	Sometimes (about half the time) 3	Most times (much more than half the time) 4	Almost always or always 5

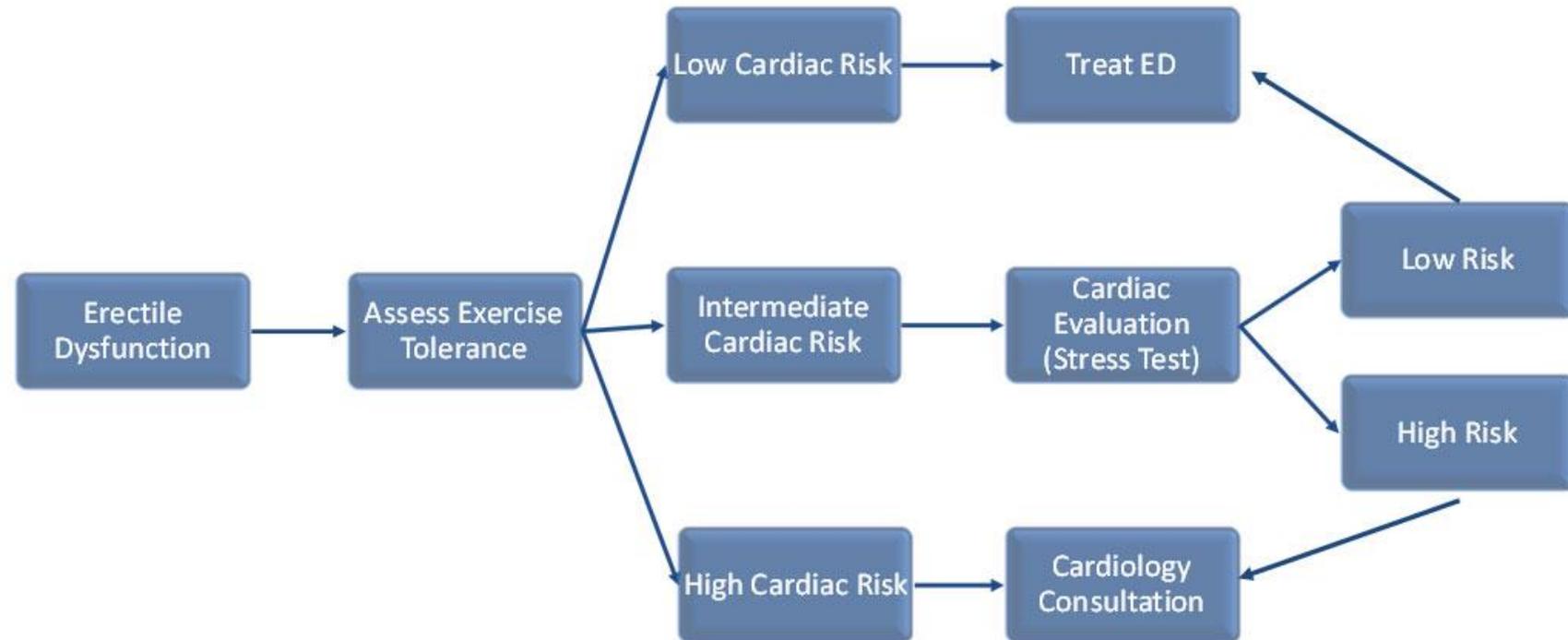
Total Score: _____

1-7: Severe ED 8-11: Moderate ED 12-16: Mild-moderate ED 17-21: Mild ED 22-25: No ED

Princeton III Criteria

Important to stratify cardiac risk prior to ED treatment

- **Low Risk** - no cardiac disease & able to exercise without cardiac symptoms
- **Intermediate Risk** – mild/moderate stable angina, MI in past 2 months, heart failure, mild cardiac valve disease, other vascular disease (PAD, CVA, TIA, etc)
- **High Risk** – poorly-controlled diabetes or HTN, angina at rest, MI within last 2 weeks, high risk arrhythmia, moderate/severe valve disease



Treatment of ED

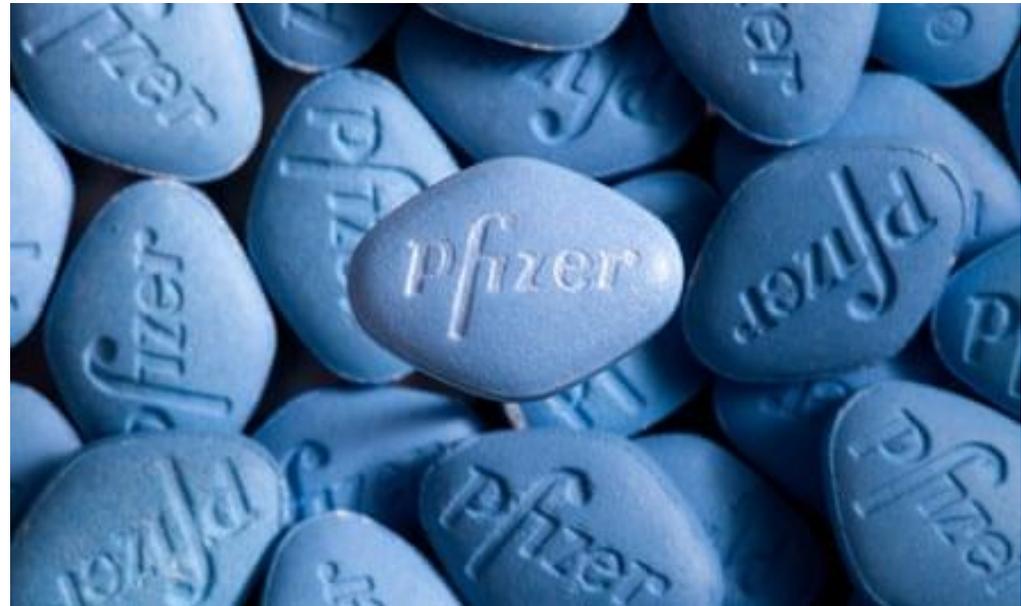
ED Treatment

First-line

- Lifestyle changes (weight loss, exercise counseling, smoking cessation)^{1,2}
- Phosphodiesterase 5 inhibitors

Second-line

- Vacuum devices
- Intraurethral alprostadil (prostaglandin E1)
- Intracavernosal Injections (ICI)
- Penile Prosthesis Surgery



ED Treatment – Phosphodiesterase Inhibitors (PDE5i)

Mechanism

- Competitive inhibitors of PDE5
- Promote high levels of cGMP in penile vasculature
- Causes smooth muscle relaxation and increased penile blood flow

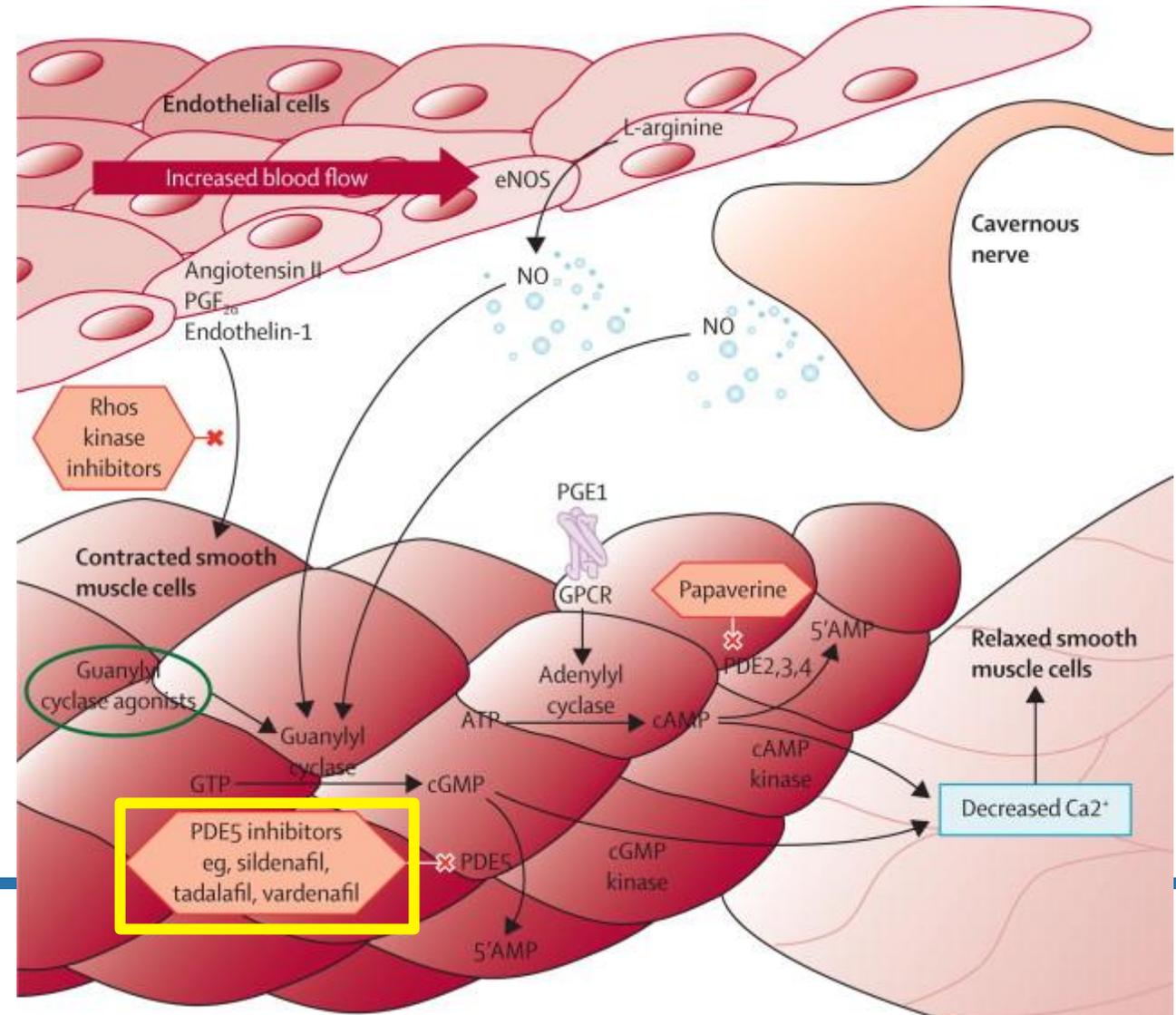


Table 1: Phosphodiesterase Type 5 Inhibitors

Drug Name	Trade Name	Tmax (hours)	Serum Half Life (hours)	Dosage (mg)
Sildenafil	Viagra [®] , Revatio [®]	1	3 - 5	25-100
Vardenafil	Levitra [®] , Staxyn [®] \$\$	1	3 - 5	5-20
Tadalafil*	Cialis [®]	2	18	5-20
Avanafil	Stendra [™] \$\$\$	0.5 - 1.5	~6	50-100

PDE5i Pearls

Generally well-tolerated, safe medications

- Good success rates: 60-75%¹
 - Long-term, sustained effect (no tachyphylaxis)
- Still require sexual arousal
- Some men who fail one PDE5i may have better response to another

PDE5i Contraindications

- One strict contraindication: **nitrites**
- Relative contraindications:
 - Decrease dose if concurrent use of alpha blockers, significant renal disease
- For vardenafil/Levitra:
 - Avoid in patients with congenital QT syndrome
 - Avoid with class IA or III antiarrhythmics (amiodarone, sotalol, quinidine)

PDE5i Side Effects

- Headache – more common with sildenafil
- Facial flushing, nasal congestion
- Dyspepsia/heartburn – lower esophageal sphincter (smooth muscle) relaxation
- Visual changes (sildenafil & vardenafil) – rare but more concerning, intraocular pressure
- Myalgias (tadalafil)

Other Treatments for ED

- Vacuum Erection Devices (VED)
- Intra-urethral suppositories
- Intracavernosal Injections (ICI)
 - Bimix = papaverine, phentolamine
 - Trimix = alprostadil, papaverine, phentolamine
- Low-intensity Shock Wave Therapy (LiSWT) – Investigational in US
- Penile Implant

Low Intensity Shock Wave Therapy (LiSWT)

- Acoustic waves transferred to target tissues causing mechanical stress, potentially increasing angiogenesis and stem cell stimulus
- LiSWT has potential benefit for mild to moderate vasculogenic ED
- Unclear treatment effect duration³
- Low-risk, non-invasive
- Not covered by insurance, so \$\$\$
- Medical grade shockwave therapy not the same as Gainswave or Phoenix (radial wave machines) used by for-profit “Mens health clinics”



Other Treatments for ED

- Vacuum Erection Devices (VED)
- Intracavernosal Injections (ICI)
 - Trimix = alprostadil, papaverine, phentolamine
- Intra-urethral suppositories
- Low-intensity Shock Wave Therapy (LiSWT)
- **Penile Implant**

Penile Implant

- Most common device is the 3-piece inflatable penile implant
- First described in 1973
- ~25,000 penile implants done annually in US
- High satisfaction rates
- Low-risk, 60-90 minute surgery
- Excellent option for patients that fail medical therapies
- Covered by Medicare, most commercial insurance
- I am working with industry representatives to address Medical issues



Conclusions

- Ask patients about their erections!
- PDE5i's are well-tolerated and have strong efficacy
- MLK Wilmington clinic Urology will now help patients
 - Screen for medical comorbidities
 - Access first, second, and third line therapies
 - Offer surgical treatment for appropriate candidates

Thank You!