Erectile Dysfunction: A Primer for Primary Care Providers

Jeanne Martin, DNP, ANP-BC

Objectives

1. Understand the definition, incidence and prevalence of Erectile Dysfunction in the U.S.
2. Understand the pathophysiology of Erectile Dysfunction
3. Identify the common causes of Erectile Dysfunction
4. Identify the implications of ED for Primary Care Providers

Disclosures

I have nothing to disclose.
Definition of Erectile Dysfunction

- Consistent or recurrent inability to attain and/or maintain penile erection sufficient for sexual satisfaction, including satisfaction sexual performance*.
- Differs from decreased libido which is a lack of desire for sexual activity.

* AUA Guidelines: Erectile Dysfunction, 2018
Incidence of ED in the U.S.

- 25.9/1000 man-years
- Incidence rates increase with each decade
  - 12.4 cases 40 - 49 yr old
  - 29.8 cases 50 – 59 yr old
  - 46.3 cases 60 – 69 yr old
- Age-adjusted risk for ED higher in men with:
  - Diabetes (50.7 cases)
  - Treated Hypertension (42.5 cases)
  - Treated Cardiovascular disease (58.3 cases)


Prevalence of ED in the U.S.

Latest prevalence study on ED (NHANES 2001-2002)

- Effects approximately 18 million men
- 18.4% (overall) of all men ≥ 20 years of age
- Highly correlates with increasing age


Prevalence of ED

<table>
<thead>
<tr>
<th>Age</th>
<th>None or Almost Always Able</th>
<th>Usually Able</th>
<th>Sometimes Able</th>
<th>Never Able</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>120006861 (95 678382)</td>
<td>1490009 (15 56925)</td>
<td>1900000 (15 92490)</td>
<td>3400001 (15 92490)</td>
</tr>
<tr>
<td>50</td>
<td>99000067 (95 469293)</td>
<td>1200000 (14 92490)</td>
<td>1600000 (14 92490)</td>
<td>3000000 (14 92490)</td>
</tr>
<tr>
<td>60</td>
<td>89000067 (95 469293)</td>
<td>1000000 (13 92490)</td>
<td>1400000 (13 92490)</td>
<td>2800000 (13 92490)</td>
</tr>
<tr>
<td>70</td>
<td>79000067 (95 469293)</td>
<td>8000000 (12 92490)</td>
<td>1200000 (12 92490)</td>
<td>2400000 (12 92490)</td>
</tr>
<tr>
<td>80</td>
<td>69000067 (95 469293)</td>
<td>6000000 (11 92490)</td>
<td>1000000 (11 92490)</td>
<td>2000000 (11 92490)</td>
</tr>
</tbody>
</table>

In response to exact question: “How would you describe your ability to get and keep an erection adequate for satisfactory intercourse?”

Saigal, C. *Archives of Internal Medicine* 2006. 166:207-212.
Prevalence of ED

Saigal, C. Archives of Internal Medicine 2006. 166:207-212.

Table 2. Data for Responses to the ED Question by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Change in Actual Weight (lbs)</th>
<th>Obesity Risk</th>
<th>Somewhat Able</th>
<th>Medium Risk</th>
<th>Able to Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>162.8 &amp; 161.9 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>30-39</td>
<td>143.7 &amp; 142.8 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>40-49</td>
<td>124.6 &amp; 123.7 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>50-59</td>
<td>114.5 &amp; 113.6 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>60-69</td>
<td>104.4 &amp; 103.5 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>70-79</td>
<td>94.3 &amp; 93.4 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
<tr>
<td>80-89</td>
<td>84.2 &amp; 83.3 (1.0 &amp; 0.8)</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
<td>2.0132803 &amp; 2.0132803</td>
</tr>
</tbody>
</table>

In response to exact question: "How would you describe your ability to get and keep an erection adequate for satisfactory intercourse?"
Prevalence of ED

Table 2: Data for Responses to the ED Question by Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Change in Sexual Ability</th>
<th>Sexuality Ability</th>
<th>Same Ability</th>
<th>Same &amp; More Ability</th>
<th>Same &amp; Same Ability</th>
<th>Same &amp; Less Ability</th>
<th>Same &amp; Reduced Ability</th>
<th>Same &amp; Less Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-34</td>
<td>150.0586 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356183 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
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<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
</tr>
<tr>
<td>35-44</td>
<td>150.0581 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356183 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
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<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
</tr>
<tr>
<td>45-54</td>
<td>150.0586 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356183 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
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<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
</tr>
<tr>
<td>55-64</td>
<td>150.0586 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356183 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
</tr>
<tr>
<td>65-74</td>
<td>150.0586 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
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<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
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<tr>
<td>75+</td>
<td>150.0586 0.85 (95% CI: 0.79 to 0.91)</td>
<td>1.357866 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356183 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356763 0.16 (95% CI: 0.11 to 0.31)</td>
<td>1.356603 0.16 (95% CI: 0.11 to 0.31)</td>
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<td>1.356783 0.16 (95% CI: 0.11 to 0.31)</td>
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</tbody>
</table>

In response to exact question: “How would you describe your ability to get and keep an erection adequate for satisfactory intercourse?”

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Anatomy of Normal Erection

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Physiology of Erection

Erection involves:
- Sinusoidal relaxation
- Arterial dilation
- Venous compression


Physiology of Veno-occlusive Mechanism

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A Word about Nitric Oxide....

- Neurotransmitter involved in erection
- One of the most potent vasodilators
- Endothelium is the primary source of Nitric Oxide
- Endothelium regulates vascular tone throughout the cardiovascular system


Major Causes of Endothelial Dysfunction

Oxidative Stress = Endothelial Dysfunction
1. Tobacco
2. Obesity
3. High fat meals
4. Sedentary behavior
5. Psychological stress


Pathophysiology of ED

Three categories:
1. Organic
2. Psychogenic
3. Mixed
Pathophysiology of ED (continued)

Drug Induced

<table>
<thead>
<tr>
<th>CLASS</th>
<th>KNOWN TO CAUSE ERECTILE DYSFUNCTION</th>
<th>SHUNTED ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antihypertensives:</td>
<td>Thiazide diuretics</td>
<td>Calcium channel blockers</td>
</tr>
<tr>
<td></td>
<td>General α blockers</td>
<td>Angiotensin converting enzyme inhibitors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Angiotensin II receptor antagonists</td>
</tr>
<tr>
<td>Psychotropic:</td>
<td>Antipsychotics</td>
<td>Antidepressants</td>
</tr>
<tr>
<td></td>
<td>Antipsychotics</td>
<td>Antidepressants</td>
</tr>
<tr>
<td>Antihistaminic</td>
<td>Antihistaminic</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antidepressants</td>
</tr>
<tr>
<td>Antiepileptic</td>
<td>Antiepileptic</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Antidepressants</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>


Pathophysiology of ED (continued)

• Antihypertensives

<table>
<thead>
<tr>
<th>AGENT</th>
<th>EFFECT</th>
<th>MECHANISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>ED</td>
<td>Unknown</td>
</tr>
<tr>
<td>α-Blocker (nonselective)</td>
<td>ED</td>
<td>Proportional to bladder outlet resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>β-Blocker (selective)</td>
<td>Decreases ED infusion rate</td>
<td>Decreases ED infusion rate</td>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>α-Blocker</td>
<td>ED</td>
<td>Increases ED infusion rate</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angiotensin-converting enzyme inhibitor</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angiotensin II receptor blocker</td>
<td>Decreases ED infusion rate</td>
<td>Decreases ED infusion rate</td>
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</tr>
</tbody>
</table>


Pathophysiology of ED (continued)

ED and Comorbid Conditions

Table 4. Associations Between ED and Various Comorbid States

<table>
<thead>
<tr>
<th>Comorbid Diagnosis</th>
<th>ED Absent**</th>
<th>ED Present*</th>
<th>Prevalence of ED Among Men With a Comorbid Diagnosis, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes mellitus</td>
<td>3575 146</td>
<td>3572 697</td>
<td>49.9</td>
</tr>
<tr>
<td>Obesity</td>
<td>16 206 023</td>
<td>4 990 098</td>
<td>23.5</td>
</tr>
<tr>
<td>Heart disease</td>
<td>3 005 592</td>
<td>3 344 906</td>
<td>52.3</td>
</tr>
<tr>
<td>Hypertension</td>
<td>13 124 111</td>
<td>7 184 282</td>
<td>35.4</td>
</tr>
<tr>
<td>Smoking</td>
<td>20 088 443</td>
<td>3 543 914</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Saigal, C (2006) Archives of Internal Medicine, 166:207 - 212

Why is ED important?

- ED increases with age and concomitant comorbidities
- Many times is a symptom of an underlying condition or disease state
- Adversely affects:
  - Quality of life
  - Decrease occupational productivity
  - Increase use of healthcare resources


Assessment of ED

- Detailed medical, sexual and psychosocial history and ROS
- Identify all known medical comorbidities
  - DM, Cardiovascular disease, HTN, HLD, obesity
- Sexual and psychosocial hx to R/O sexual abuse, current relationships
- Review medications
- Identify symptoms through use of screening tools
  - Self-administered validated questionnaire
  - International Index of Erectile Function (IIEF)
  - Sexual Health Inventory for Males (SHIM)
Screening Tools

- Both IIEF and SHIM are psychometrically validated tools
- IIEF – 15 question survey
- SHIM – abridged version of IIEF
  - 5 questions
  - Easy to use
  - To gauge sexual function over last 6 months
  - Can be used by Primary Care Providers
- Score ≤ 21 = suspicious for ED

SHIM questionnaire


Sexual History – sample questions

Psychosocial History – sample questions

Sample Psychosocial Assessment Questions

- Do you suffer from depression or other mood problems?
- Have you seen a psychiatrist or other mental health professional in recent years? If yes, please describe the circumstances and outcome.
- How are your relationships with family members and other important people in your life?
- Do you have any difficulties in your work situation, if applicable?
- How is your current relationship with your partner? How was it in the past?
- Were you ever the victim of sexual abuse (e.g., forced to have sex)? If you, what effort did this have on you then? "What about now?"
- Is your economic situation contributing to significant stress in your life?

Adapted from Jardin, et al., Erectile Dysfunction: 1st International Consultant on Erectile Dysfunction, 2000

Physical Exam

- Abdomen
- Penis
- Testes
- Secondary sexual characteristics
- Lower extremity pulses

Laboratory Tests

- Hormonal labs
  - FSH, LH, Prolactin, am Testosterone levels
- Routine labs
  - CBC, BMP, Lipid profile, HgA1C, TSH
- PSA
Fix what you can......

- Modify risk factors
  - Smoking cessation
  - Dietary changes
  - Increased exercise
  - Reconcile and revise medications where appropriate
  - Psychological counseling if appropriate

Treatment Options

- 1st line therapy = Phosphodiesterase 5 inhibitors (PDE5 inhibitors)
  - Sildenafil (Viagra®)
  - Vardenafil (Levitra®)
  - Tadalafil (Cialis®)

Contraindicated in men who take nitrates
Can cause severe hypotension → MI

AUA Guidelines state no one PDE5-I superior over the other*


Comparison between PDE5-I

<table>
<thead>
<tr>
<th>Drug/dose</th>
<th>T(max)</th>
<th>T(1/2)</th>
<th>Considerations</th>
<th>Adverse Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sildenafil 100mg</td>
<td>1.16 hr</td>
<td>4 hr</td>
<td>Avoid taking with fatty meal No Nitrates</td>
<td>Flushing, headache, visual disturbances, hypotension, nasal congestion, dyspepsia</td>
</tr>
<tr>
<td>Vardenafil 20mg</td>
<td>0.75 hr</td>
<td>4 hr</td>
<td>No Nitrates Can be taken with fatty food Contraindicated for pts with retinopathy or severe renal impairment</td>
<td>Headache, flushing, dyspepsia, nasal congestion</td>
</tr>
<tr>
<td>Tadalafil 20mg</td>
<td>2.0 hr</td>
<td>18 hr</td>
<td>Improved spontaneity due to long half-life No Nitrates Adjust for renal disease</td>
<td>Headache, flushing, dyspepsia, nasal congestion, back pain, myalgia</td>
</tr>
</tbody>
</table>
PDE5 –Inhibitor Treatment*

- PDE5-I treatment reassessed in 4-8 weeks
- Before treatment failure considered
  - Review appropriate administration of meds
  - R/O lack of sexual stimulation
  - Counsel against heavy alcohol use
  - Titrate up dose as tolerated


Other therapies

- If patient fails PDE5-I, refer to Urologist for additional therapy options*
  - Non Surgical
    - Alprostadil intra-urethral suppositories
    - Vasoactive intra-cavernosal injections
    - Vacuum Constrictive Device
  - Surgical
    - Penile prosthesis placement
      - Semirigid
      - 3-piece inflatable


Alprostadil (Muse) suppository
Intra-cavernosal injection therapy

Vacuum Erection Device

Semi Rigid Penile Prosthesis
3 piece Inflatable Penile Prosthesis

- Additional therapies – Not recommended*
  - Penile venous surgery
  - Low intensity extracorporal shock wave therapy (considered investigational)
  - Intra-cavernosal stem cell therapy (considered investigational)
  - Platelet rich plasma therapy (considered experimental)

AUA Guidelines (2018), American Urological Association

- Implications for Primary Care Providers
  - Important to take a detailed history on males
  - Should include
    - Medication review
    - Comorbidity review
    - Sexual history
    - Psychosocial history
  - Especially important in males with
    - DM
    - HTN
    - HLD
    - Vascular disease
    - Smokers
Key Points to Remember

- ED is usually a symptom of other pathology
- Often, first symptom of other disease states
- Can often have mixed components (organic + psychogenic)
- Impacts on Quality of Life
- Incidence increases with age

Questions?

Thank You!
References
