

Supplemental Materials for

Abdul Muin M, Ahmad S, Jasman M, Abdul Aziz A, Ali M, Md Zainuddin Z. Improving erectile dysfunction management among Asian men with diabetes using the knowledge translation intervention. *Ann Fam Med*. 2023;21(6):502-507.

Supplemental Appendix 1

☐ PROMPT SHEET: ENGLISH

- ☐ Erectile dysfunction (ED) is common in patients with diabetes.
- ☐ Up to 70% of diabetic patients have ED.
- ☐ Men with ED are more likely to suffer from heart disease.
- ☐ ED can be treated effectively.
- ☐ Your doctor is willing to discuss your sexual problem if you wish to.

You may want to ask your doctor the following questions:

- ☐ I do not want to talk about ED
- ☐ I want to discuss the risk factor of getting ED
- ☐ I want to discuss treatment for ED
- ☐ I want to discuss the severity of ED

Khalid NM, Tong SF, Monoto EMM. The effectiveness of “prompt sheet” in initiating a discussion of sexual dysfunction among male patients with diabetes in a primary care setting: an open-label control trial. *J Mens Health*. 2022;18(6).



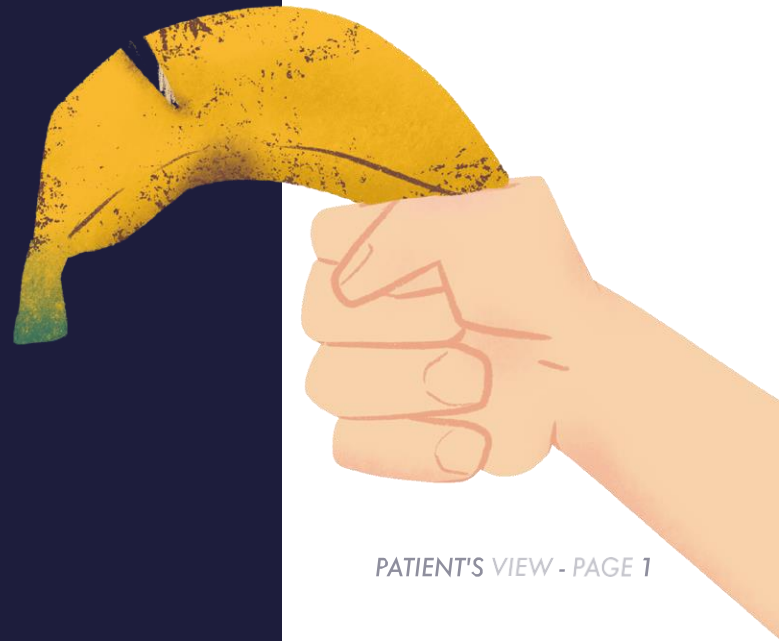
LASTED

KNOWLEDGE TRANSLATION TOOLS IN THE MANAGEMENT OF ERECTILE DYSFUNCTION
MANAGING **ERECTILE DYSFUNCTION** EFFECTIVELY

DEFINITION OF ERECTILE DYSFUNCTION (ED)

ED is defined as persistent inability to maintain a penile erection sufficient for sexual performance¹

Despite 5 in 10 men have ED in general, it is more common among the diabetics where 9 in 10 suffer from ED^{2,3}



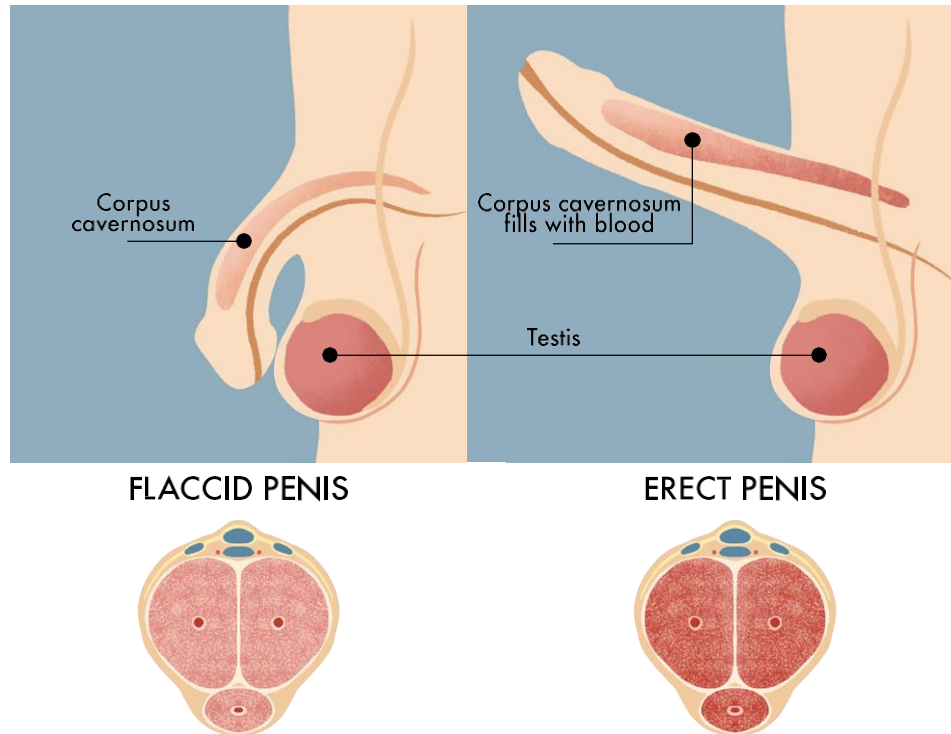
DEFINITION OF ERECTILE DYSFUNCTION (ED)

ED is defined as persistent inability to maintain a penile erection sufficient for sexual performance¹

- Most clinicians and researchers defined the duration of at least 3 - 6 months
- Prevalence of ED in healthy men age 40 to 70 years old is 52%²
- Prevalence of ED is higher in diabetes up to 80 - 90%³
- Unfortunately, ED is always underscreened, underdiagnosed and undertreated



MECHANISM OF PENILE ERECTION⁴



Erection is a complex process involving various systems including the brain, nerves, hormones and blood vessels.

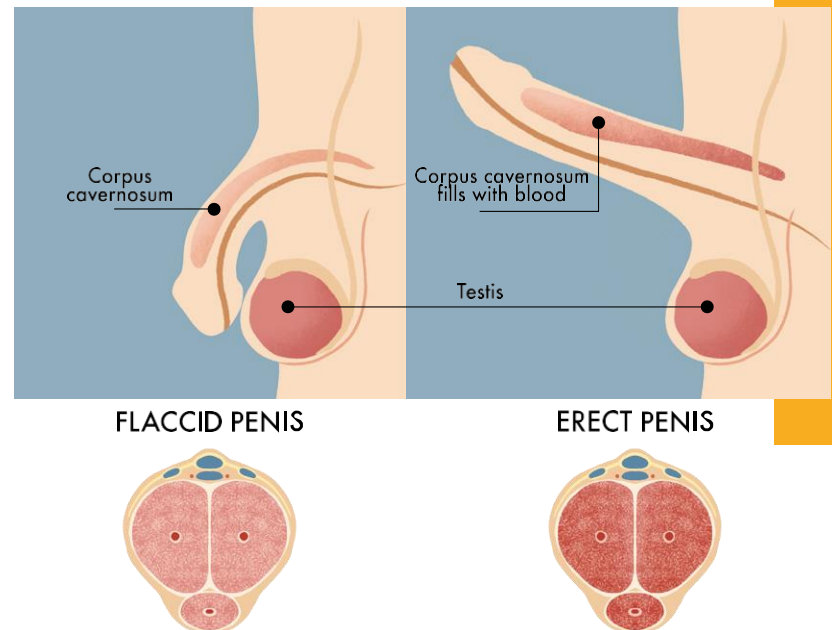
MECHANISM OF PENILE ERECTION⁴

Erection is a complex process involving various systems including the brain, nerves, hormones and blood vessels.

Following a psychological or physical stimulation, the brain sends signals to the penis through the nervous system causing the smooth muscle of the corpus cavernosum to relax.

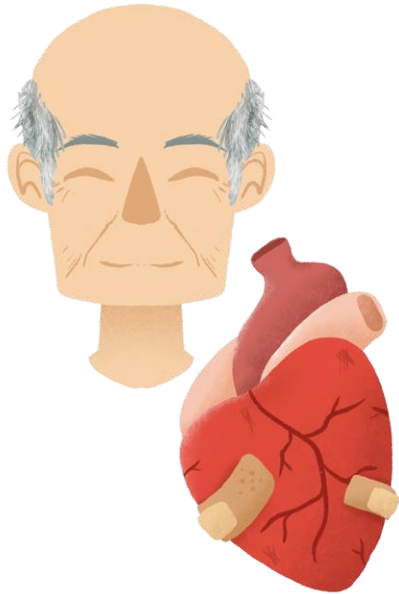
Blood vessel lumens will open wide and more blood flows through the vessels, filling the corpus cavernosum.

Simultaneously, the veins that carry blood away from the penis is shut down. Hence, the blood is trapped in the corpus cavernosum, causing the penis to enlarge, and to erect as well as becoming hard.

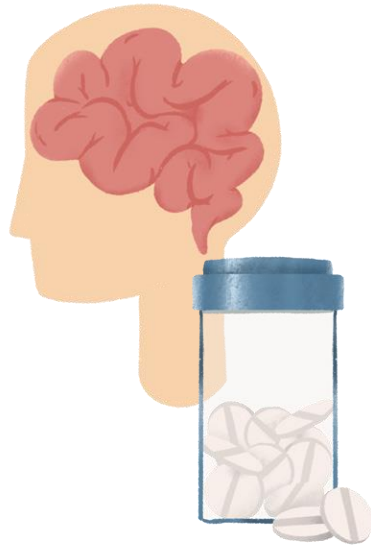


CAUSES OF ERECTILE DYSFUNCTION⁵

ORGANIC








PSYCHOGENIC



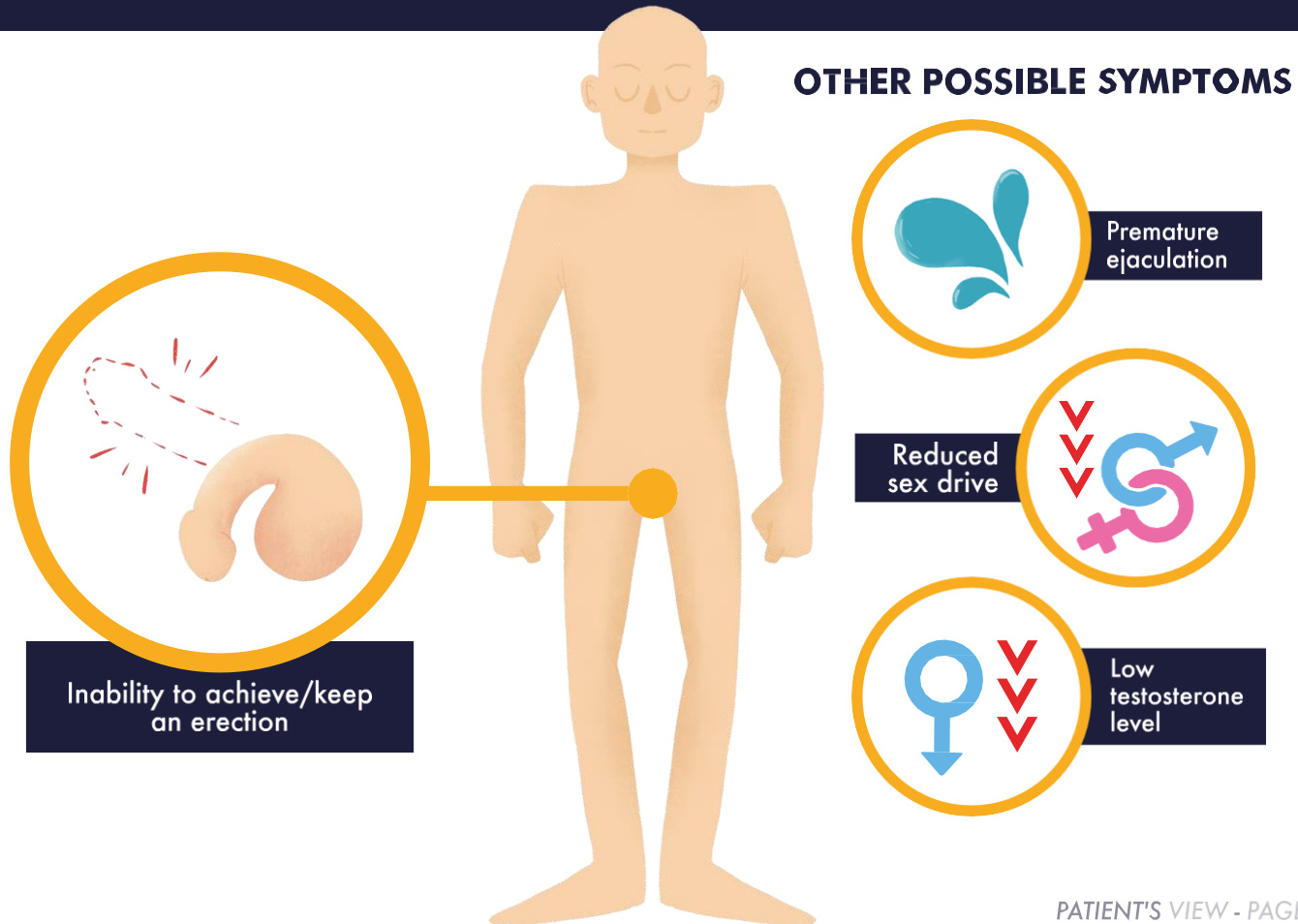
MIXED



CAUSES OF ERECTILE DYSFUNCTION⁵

CAUSES OF ED	COMMON CAUSES	PATHOPHYSIOLOGY
Vasculogenic	Hypertension, atherosclerosis, dyslipidemia, diabetes mellitus, obesity, tobacco use	<ul style="list-style-type: none"> • Impaired penile veno-occlusion • Inadequate arterial inflow
 Hormonal	Low testosterone, hyperprolactinemia, diabetes mellitus, chronic opioid use 	<ul style="list-style-type: none"> • Loss of libido • Inadequate Nitric Oxide release • Morphological changes in the penis
Neurogenic	Stroke, Alzheimer's disease, spinal cord injury, diabetic neuropathy	<ul style="list-style-type: none"> • Interrupted neuronal innervation • Failure to initiate Nitric Oxide release
Psychogenic	Depression, psychological stress, performance anxiety, relationship problems 	<ul style="list-style-type: none"> • Impaired Nitric Oxide release • Loss of libido • Sympathetic nervous system activation
Systemic Disease	Aging, diabetes mellitus, chronic renal failure, generalized atherosclerotic disease	<ul style="list-style-type: none"> • Multifactorial • Neuronal and vascular dysfunction
Drug-induced	Antihypertensives, antiandrogens, antidepressants, alcohol abuse 	<ul style="list-style-type: none"> • Central nervous system suppression • Decreased libido • Vascular insufficiency 

SYMPTOMS OF ERECTILE DYSFUNCTION^{4,5}

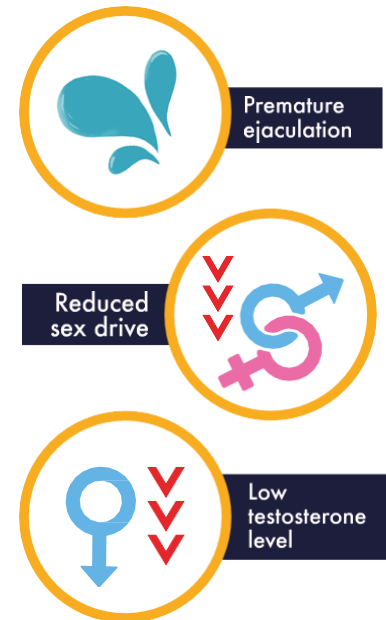


SYMPTOMS OF ERECTILE DYSFUNCTION^{4,5}

- Difficulty in getting an erection
- Difficulty sustaining an erection long enough for sexual intercourse
- Reduced sexual drive and libido
- Concomitant premature ejaculation



OTHER POSSIBLE SYMPTOMS



ERECTION HARDNESS SCORE (EHS)



1

TOFU

The penis is large
but not hard



2

PEELED BANANA

The penis is hard but
not hard enough for
penetration



3

UNPEELED BANANA

The penis is hard
enough for penetration
but not completely hard



4

CUCUMBER

The penis is hard
and completely rigid

**SEVERE ERECTILE
DYSFUNCTION**

**MODERATE ERECTILE
DYSFUNCTION**

**SUBOPTIMAL
ERECTION**

**OPTIMAL
ERECTION**

ERECTION HARDNESS SCORE (EHS)



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**SEVERE ERECTILE
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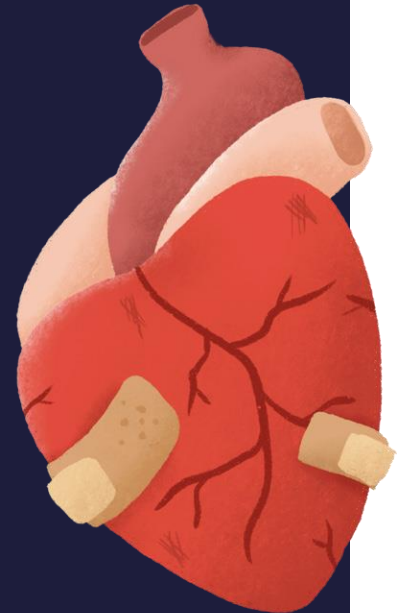
EHS is a single item patient reported outcome for scoring erection hardness and can be used to initially assess the severity of Erectile Dysfunction

ERECTILE DYSFUNCTION AND CARDIOVASCULAR RISK^{7,8}



There is a very strong link between ED and heart disease.

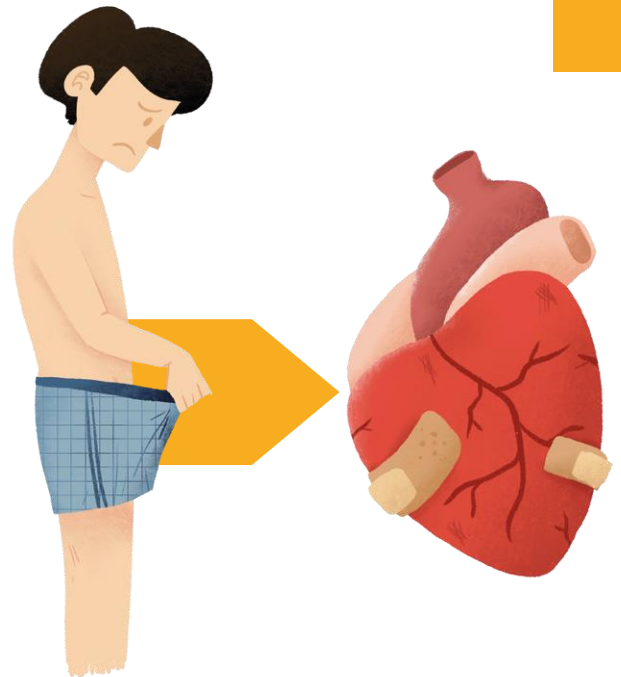
If a man has ED, he has a greater risk of having heart disease.



ERECTILE DYSFUNCTION AND CARDIOVASCULAR RISK^{7,8}

There is a very strong link between ED and heart disease:

- If a man has ED, he has a greater risk of having heart disease
- ED and heart disease share many of the same risk factors and often coexist.
- ED is also an independent marker of increased risk for heart disease
- ED commonly occurs in the presence of silent heart disease and there's a window period of 2 to 5 years from the onset of ED to a cardiac event.



CARDIAC RISK STRATIFICATION⁹

Cardiovascular risk stratification is important in deciding appropriate treatment for ED as cardiac events could be reflected by sexual performance.



The amount of energy used by the body during sexual activity



Briskly climbing two flight of stairs in 10 seconds



Walking 1 mile (1.6 km) on the flat surface in 20 minutes

CARDIAC RISK STRATIFICATION⁹

Sexual activity is comparable to mild to moderate physical activity in the range of 3 to 5 MET (Metabolic Equivalent of Task)
e.g. climbing two flights of stairs or walking 1 mile (1.6 km) on the flat surface in 20 minutes.

Sexual activity is reasonable for patients who can exercise 3 to 5 MET without any cardiac symptoms such as chest pain, shortness of breath or low blood pressure

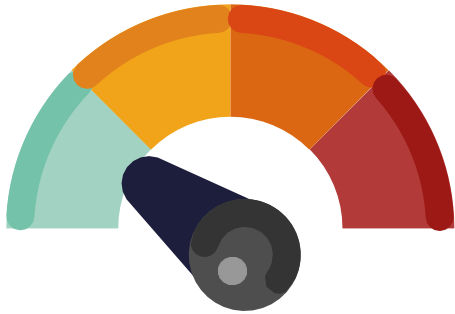
Cardiovascular risk stratification is important in deciding appropriate treatment for ED as cardiac events could be reflected by sexual performance.

Patients with ED should be risk-stratified based on the table below (adapted from The Princeton III Consensus)

LOW-RISK CATEGORY	INDETERMINATE-RISK CATEGORY	HIGH-RISK CATEGORY
Asymptomatic, <3 risk factors for CAD (excluding sex)	≥3 risk factors for CAD (excluding sex)	High-risk arrhythmias
Mild, stable angina (evaluated and/or being treated)	Moderate, stable angina	Unstable or refractory angina
Uncomplicated previous MI	Recent MI (>2, <6 weeks)	Recent MI (<2 weeks)
LVD/CHF (NYHA class I or II)	LVD/CHF (NYHA class III)	LVD/CHF (NYHA class IV)
Post-successful coronary revascularisation	Non-cardiac sequelae or atherosclerotic disease (e.g. stroke, peripheral vascular disease)	Hypertrophic obstructive and other cardiomyopathies
Controlled hypertension		Uncontrolled hypertension
Mild valvular disease		Moderate-to-severe valvular disease

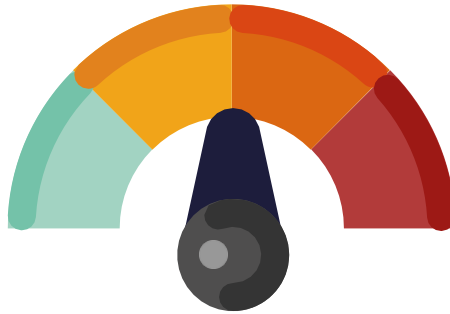
CAD = coronary artery disease; CHF = congestive heart failure; LVD = left ventricular dysfunction;
MI = myocardial infarction; NYHA = New York Heart Association.

CARDIAC RISK STRATIFICATION⁹



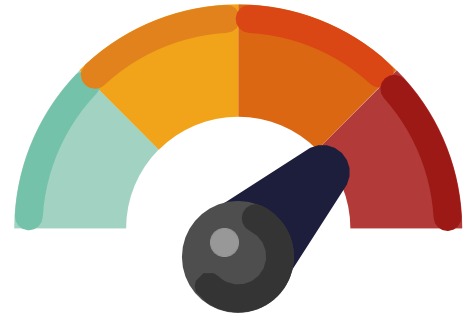
LOW RISK

Low-risk individuals can initiate or resume sexual activity and begin ED treatment without further testing or evaluation



INDETERMINATE RISK

Indeterminate-risk individuals need to be referred for Exercise Stress Test to assess exercise ability



HIGH RISK

High-risk individuals should be referred for cardiac assessment and treatment

CARDIAC RISK STRATIFICATION⁹



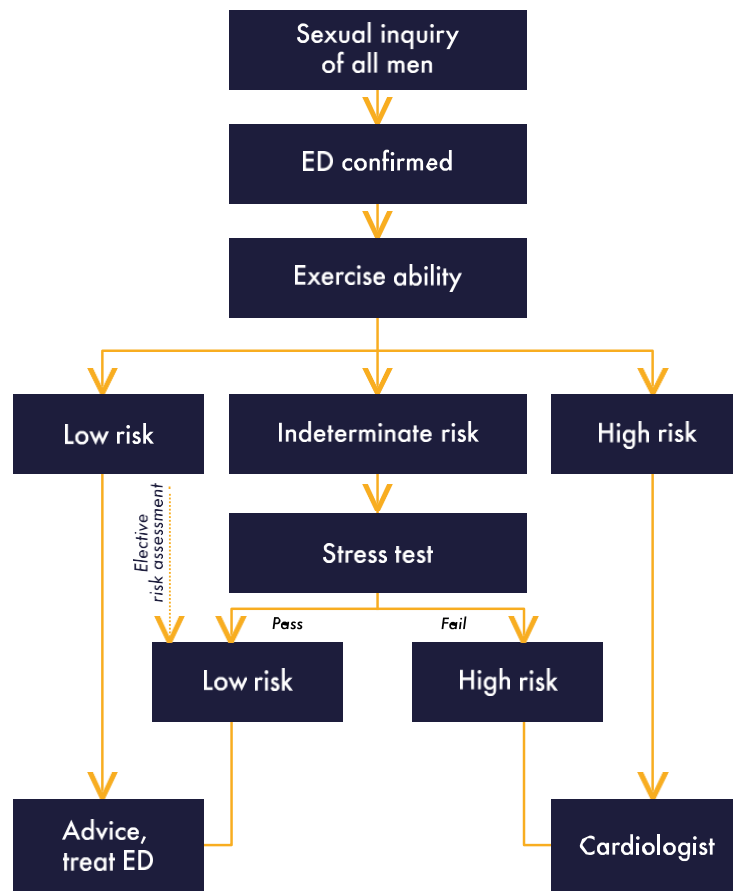
Sexual activity does not represent significant cardiac risk. Patients can generally perform exercise of modest intensity without symptoms. They can resume sexual activity and treatment for ED can be initiated without further evaluation.



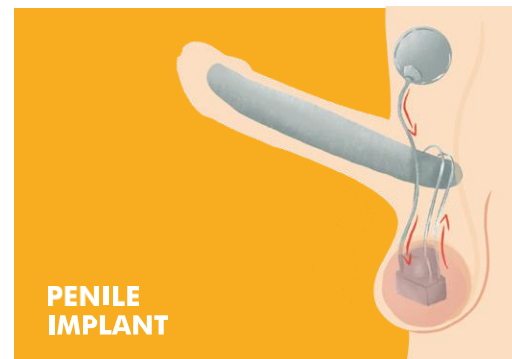
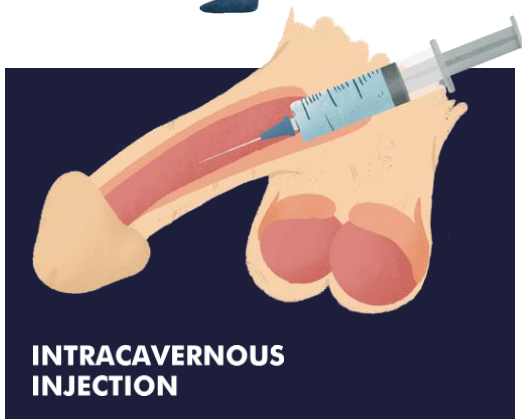
Patients with uncertain cardiac condition requires stress test evaluation before the resumption of sexual activity. Completing 4 minutes of the standard Bruce treadmill protocol without symptoms, arrhythmias, or a fall in systolic BP indicates that sexual activity is safe.



Cardiac condition that is severe and/or unstable for sexual activity carry significant cardiovascular risk. High risk patients have moderate to severe symptomatic heart disease and should be referred for cardiac assessment and treatment. Sexual activity should be stopped until the patient's cardiac condition has been stabilized by treatment.



TREATMENT OF ERECTILE DYSFUNCTION^{4,5}



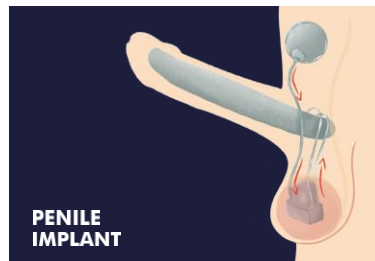
TREATMENT OF ERECTILE DYSFUNCTION^{4,5}

Treatment of Erectile Dysfunction involves a multimodal approach

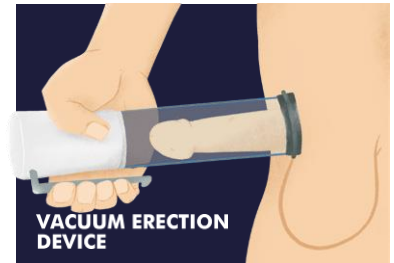
NON PHARMACOLOGICAL



SURGICAL



PHARMACOLOGICAL



LIFESTYLE CHANGES¹⁰



Physical Activity



Stop Smoking



Reduce Alcohol Intake



Weight Reduction



Dietary Modification

LIFESTYLE CHANGES¹⁰



Physical Activity

Moderate and high physical activities for 150mins per week are associated with a lower risk of ED.



Stop Smoking

Both the direct use of tobacco and secondhand exposure are consolidated risk factors for ED.



Reduce Alcohol Intake

72% of chronic and persistent alcohol abusers had male sexual dysfunction.



Weight Reductions

Overweight, obesity and metabolic syndrome are associated with an increased risk of ED.



Dietary Modification

Dietary modification with high content of whole grain foods, legumes, vegetables and fruits are associated with a reduced risk of ED. Besides, limiting red meat, full fat dairy products, as well as high in added sugar food and beverages, are also important to improve ED.

ORAL MEDICATION^{4,5}

	SILDENAFIL	TADALAFIL	VARDENAFIL	AVANAFIL
BRAND NAME	Viagra	Cialis	Levitra	Spedra
Dose	25 - 100mg/day	5 - 20mg/day PRN 2.5 - 5mg/day OD	5 - 20mg/day	50 - 200mg/day
On-Demand use	Yes	Yes	Yes	Yes
Daily use	No	Yes	No	No
Administration time	1 hour before sex	30 mins before sex	30 mins before sex	15 mins before sex
Common side effects	Facial blushing Headache Indigestion	Headache Indigestion	Facial blushing Headache	Facial blushing Headache

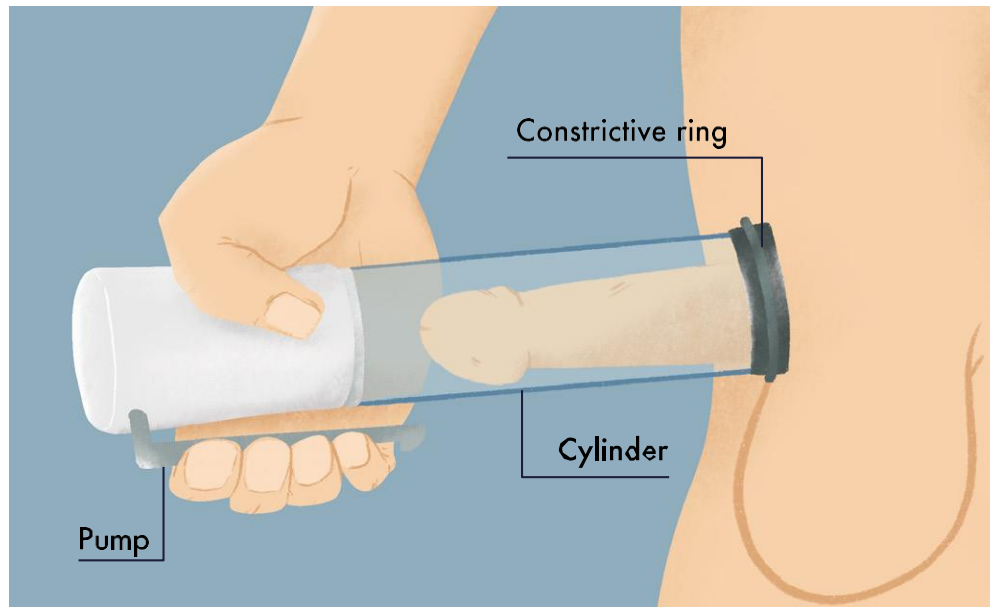
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Contraindications for PDE 5 Inhibitor

- History of myocardial infarction, stroke, or life-threatening arrhythmia within the last 6 months
- Uncontrolled hypertension (BP > 170/100 mmHg)
- Patients with unstable angina, angina with sexual intercourse, or congestive heart failure (NYHA IV)
- Patients who are using any form of organic nitrate (e.g. nitroglycerine, isosorbide mononitrate, and isosorbide dinitrate)

VACUUM ERECTION DEVICE^{4,5}

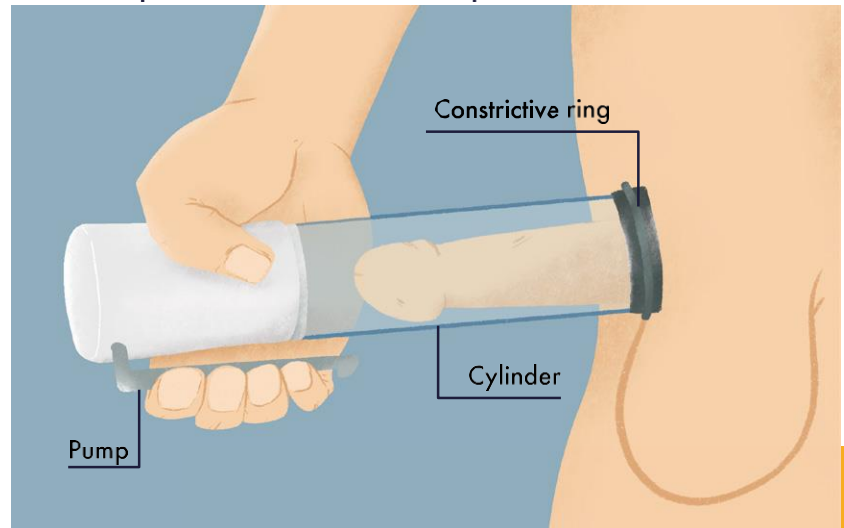


A vacuum erection device (VED) is an external acrylic pump to help a man attain and maintain an erection.

The VED consists of a constrictive ring and a cylinder that goes over the penis with a battery-operated or manual pump.

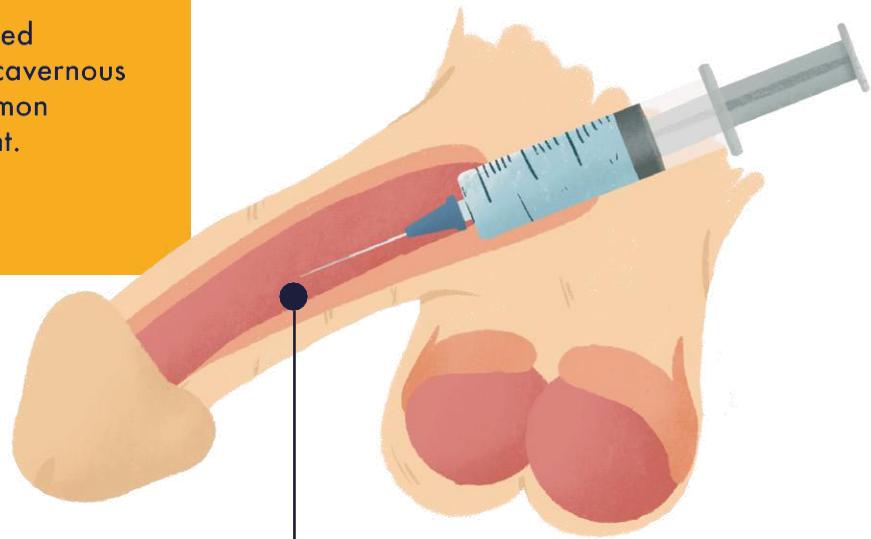
VACUUM ERECTION DEVICE^{4,5}

- A vacuum erection device (VED) is an external acrylic pump to help a man attain and maintain an erection.
- The VED consists of a constrictive ring and a cylinder that goes over the penis with a battery-operated or manual pump.
- The VED provides passive engorgement of the penis, and the constrictive ring at the base of the penis helps to retain blood within the corpora carvenosa of the penis.
- The constrictive ring can be left on safely for up to 30 minutes to allow for successful intercourse.
- The most common adverse events include pain, inability to ejaculate, petechiae, bruising, and numbness, which occur in < 30% of patients.

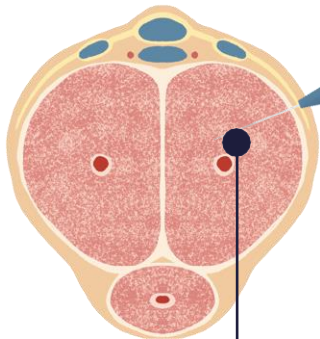


INTRACAVERNOUS INJECTIONS^{4,5}

Patients not responding to oral drugs may be offered intracavernous injections. The success rate of intracavernous injection is up to 85%. Alprostadil is the most common intracavernous injection drug used for ED treatment.



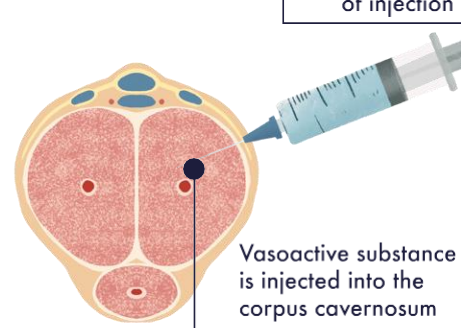
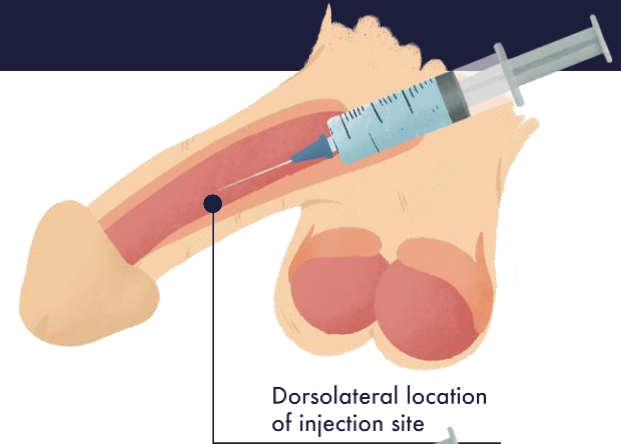
Dorsolateral location
of injection site



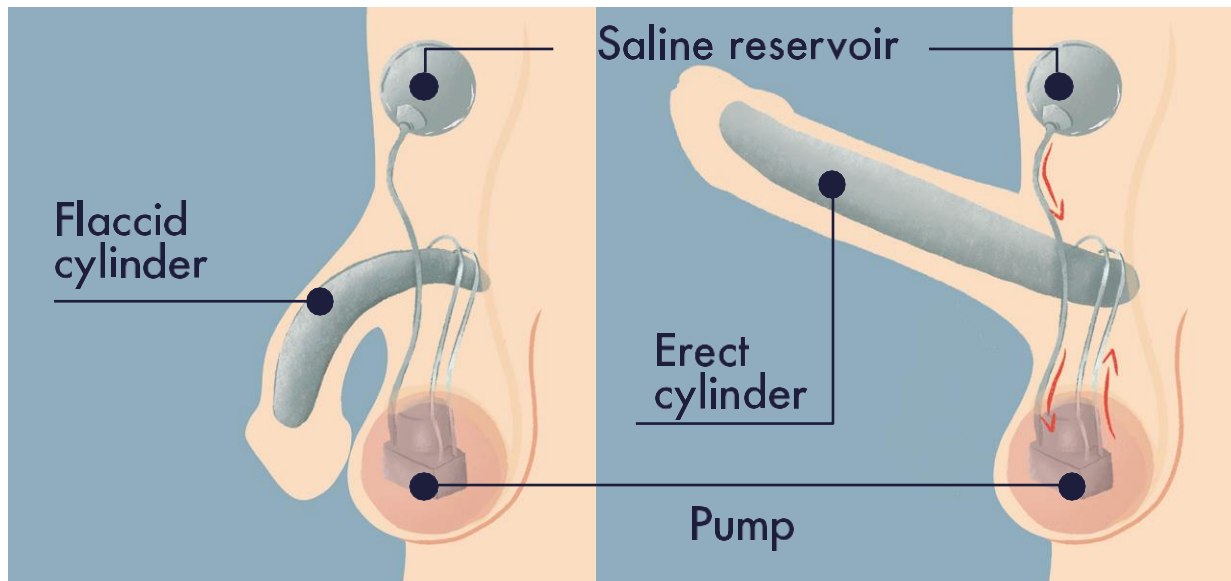
Vasoactive substance
is injected into the
corpus cavernosum

INTRACAVERNOUS INJECTIONS^{4,5}

- Patients not responding to oral drugs may be offered intracavernous injections.
- The success rate of intracavernous injection is up to 85%
- Alprostadil is the most common intracavernous injection drug used for ED treatment.
- Most efficacious as monotherapy at a dose of 5 - 40 μg
- The erection appears after 5 - 15 minutes and lasts according to the dose injected.
- Complications of intracavernous injection include penile pain, prolonged erections, priapism, and fibrosis.



PENILE PROSTHESIS^{4,5}



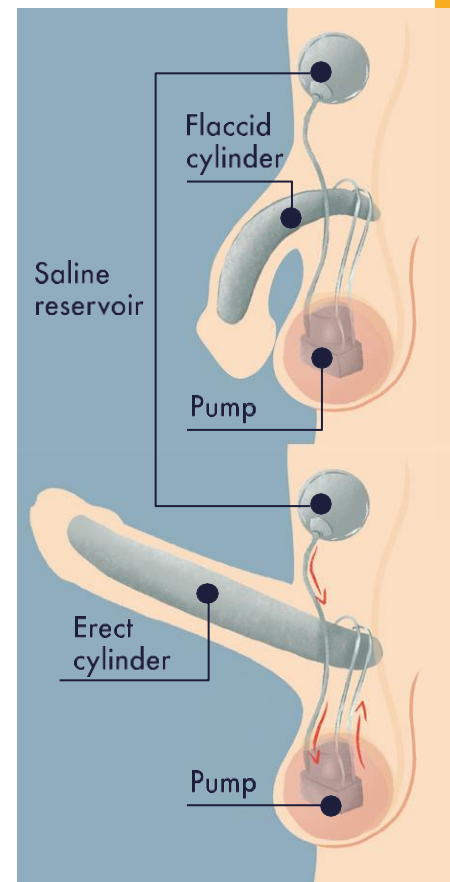
Penile prosthesis may be considered if pharmacotherapy failed or for those who prefer a permanent solution.

The commonest prosthesis is the inflatable type which consists of two attached cylinders, a reservoir and a pump.

Satisfaction rates with the prosthesis are up to 90%.

PENILE PROSTHESIS^{4,5}

- Penile prosthesis may be considered if pharmacotherapy failed or for those who prefer a permanent solution
- The commonest prosthesis are inflatable type which consists of two attached cylinders, a reservoir and a pump
- Satisfaction rates with the prosthesis are up to 90%
- When the penis is inflated, the prosthesis makes the penis hard and thick, similar to a natural erection
- Penile implant surgery can be done either as inpatient or outpatient setting by experts
- A man can resume sexual intercourse by 6 weeks after surgery
- The two main complications of penile prosthesis implantation are mechanical failure and infection



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